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S G P I—818 S I I C—30-8-18.

QUESTIONS FOR THE ASSISTANCE OF WITNESSES.

I.—Financial aid to Industrial Enterprises.

Capital.

1. Please state if you have had any experience of the raising of capital for industrial enterprises?

If so, what difficulties have you found in doing so?

What suggestions have you to make for removing these difficulties?

2. What are the sources from which capital for industrial enterprises is principally drawn?

2 (*a*). Can you suggest any new sources from which capital may be drawn?

3. Do you know of any kinds of industrial enterprises where more concerns have been started than can be maintained in full time employment?

If so, please describe the general conditions.

Government assistance.

4. What is your knowledge or experience of financial aid by Government to industrial enterprises?

5. What are your opinions on the following methods of giving Government aid to existing or new industries:—

(1) money grants-in-aid;

(2) bounties and subsidies;

(3) guaranteed dividends for a limited period, with or without subsequent refund to Government of the expenditure incurred in paying dividends at the guaranteed rate;

(4) loans, with or without interest;

(5) supply of machinery and plant on the hire-purchase system;

(6) provision of part of share capital of companies on the same basis as public subscriptions of capital;

(7) guaranteed or preferential Government purchase of products for limited periods and

(8) exemption for a limited period of the profits of new undertakings from income-tax; and exemption from any tax on an industry, or on any article used in an industry?

6. In which methods of Government assistance should there be Government control or supervision?

What should be the form of such control or supervision? (*E.g.* Government audit or appointment of Government directors with defined powers for the period during which direct assistance lasts.)

Pioneer factories.

7. What is your experience or opinion of Government pioneer factories?

[Note.—By pioneer factories are meant those established primarily to ascertain whether a new industry is commercially practicable?

By demonstration factories (see Questions 19 and 20) are meant those established primarily for giving demonstrations of, and instruction in, improved methods for industries which have been proved to be commercially practicable.]

8. In what ways and to what extent should Government pioneer industries?

At what stage should pioneer factories be either closed or handed over to private capitalists or companies?

What limits and restrictions, if any, should be imposed on the conversion of successful pioneering experiments into permanent Government enterprises?

Financing agencies.

9. In your experience what industries are hampered by the conditions under which they are financed as going concerns?

Please describe the method of financing and its effect on the industry in each case.

10. In what ways is it possible to give more assistance to industrial undertakings by existing or new banking agencies?

10 (*a*). Do you think there is need of a banking law?

[See also question 39.]

Co-operative societies.

11. Do you know of any industries which have been developed or assisted by the formation of co-operative societies?

What were the exact means adopted and what were the results obtained?

12. In your experience what are the industries for which co-operative societies should be encouraged?

What should be the organisation and special objects of these Societies?

12 (*a*). What suggestions have you to make for industrial development by means of Trade Guilds, such as exist in other countries?

How far should the State encourage the promotion of such Guilds?

imits of Govern-
ent assistance.

13. What principles should be followed in order to prevent Government aid competing with existing, or discouraging fresh, private enterprises.

14. Should there be any limitations on Government aid to a new enterprise if it competes with an established external trade?

II.—TECHNICAL AID TO INDUSTRIES.

echnical aid in
eneral.

15. What is your personal knowledge or experience of technical and scientific aid provided by Government to industrial enterprise?

16. What is your personal knowledge or experience of noticeable benefits received by local industries from researches conducted by Government departments?

17. On what conditions should the loan of Government experts be made to private firms or companies?

18. Under what restrictions and conditions would you allow publication of the results of researches made by a Government paid expert while attached to a private business?

emonstration
ctories.

19. Can you suggest any industry for which Government demonstration factories should be adopted and on what lines? (See note below Question 7.)

20. Should any demonstration factories be instituted in your province?

esearch abroad.

21. What has been your experience of the aid afforded by the Scientific and Technical Department of the Imperial Institute?

What are its advantages and disadvantages?

22. In addition to arrangements made for research in India, is it advantageous to have provision for research for special subjects in the United Kingdom?

If so, for what special purposes is it advantageous to conduct researches in England rather than in India?

23. In what ways can the Advisory Council for Research in the United Kingdom give assistance to Indian industries?

24. Can you suggest for this country any system, similar to that of the Advisory Council for Research in the United Kingdom, for referring research problems to Colleges and other appropriate institutions in India? (See Questions 75 and 76.)

rveys for
dustrial purposes.

25. Does the existing knowledge of the available resources of the country—agricultural, forest, mineral, etc.—require to be supplemented by further surveys?

26. How should such a survey be organised?

What should be its precise objects?

27. How should its results be made most useful to industries?

27 (*a*). What is your experience or opinion of the value of Consulting Engineers appointed by Government to aid industrial enterprise by technical advice and by the supply of plans and estimates?

(*b*) Should such Consulting Engineers be allowed to undertake the purchase of machinery and plant for private firms or individuals? If so, under what conditions?

[See Question 63 *et seq.*]

III.—ASSISTANCE IN MARKETING PRODUCTS.

mmercial
useums.

28. What is your experience or opinion of commercial museums, *e.g.*, that in Calcutta?

29. If you think commercial museums should be developed and increased in number, what suggestions have you to make regarding their situation, arrangement and working?

les agencies.

30. What is your experience or opinion of sales agencies or commercial emporia for the sale as well as the display of the products of minor and unorganised cottage industries.

How should they be developed?

hibitions.

30 (*a*) Would travelling exhibitions of such industries be of advantage?

31. What is your opinion or experience of the value of industrial exhibitions?

32. Should Government take measures to hold or to encourage such exhibitions?

If so what should be the Government policy?

33. What should be the nature of such exhibitions?

Should they be popular in character, or should they aim merely at bringing sellers and buyers into contact?

Trade representatives.

34. Should trade representatives be appointed to represent the whole of India, in Great Britain, the Colonies and Foreign Countries ?

What should be the qualifications of these trade representatives ?

How should their duties be defined ?

35. In addition to these trade representatives would it be suitable in some cases also to have temporary Commissions for special enquiries ?

36. Should provinces in India itself have trade representatives in other provinces ?

How should such representation be arranged for ?

Government patronage.

37. Should the principal Government departments which use imported articles publish lists of these articles, or exhibit them in commercial museums ?

38. With reference to the encouragement of Indian industries, have you any criticisms to offer regarding the working of the present rules relating to the purchase of stores by Government departments ?

Have you any changes to propose in the rules themselves ?

Banking facilities.

39. In what way is it possible to assist in marketing indigenous products by more banking facilities, either through existing agencies (such as the Presidency Exchange, Joint Stock and Co-operative Credit Bank) or through new agencies (such as Industrial and Hypothec Banks) ? (see also Question 10.)

IV.—OTHER FORMS OF GOVERNMENT AID TO INDUSTRIES.

Supply of raw materials.

40. What conditions should control the supply of Government-owned raw materials (*e.g.* forest products) on favourable terms ?

Land policy.

41. Is there any check at present imposed on industrial development in your province by the land policy of Government ?

If so, what remedies do you suggest ?

(NOTE.—The expression "land policy" is intended to cover laws and regulations relating to settlements, the Government assessment, rents, tenant rights, permission to use land for industrial purposes, and generally all matters connected with the ownership and use of land.)

42. On what principles should Government give concessions of land for the establishment of new, or the development of existing, industries ?

43. What criticisms have you to make regarding the working of the present law for the acquisition of land on behalf of industrial companies ?

What modifications of the law do you recommend ?

43. (*a*) In what ways and on what terms can Government assist in the provision of subterranean or surplus surface water for industrial purposes.

V.—TRAINING OF LABOUR AND SUPERVISION.

General.

44. (*a*) Do you think that the lack of primary education hinders industrial development ?

(*b*) What has been done in any industry of which you have had experience to improve the labourers' efficiency and skill ?

45. What steps do you consider should be adopted to improve the labourers' efficiency and skill—

(*a*) generally, and

(*b*) in any industry of which you have had experience ?

Apprenticeship system and industrial and other schools.

46. What special knowledge or experience have you of the training of apprentices in factories and workshops ?

47. What advantages have you observed to follow from the establishment of industrial schools ?

48. On what lines should these two systems of training (*e.g.*, apprenticeship system and industrial schools) be developed and co-ordinated ?

49. What has been your experience of day schools for short-time employees, or of night schools ?

How should these be developed ?

50. Should industrial and technical schools and commercial colleges be under the control of the Department of Education or of a Department of Industries ?

What measures should be adopted in order that these two departments should work in unison in controlling industrial schools ?

Training of supervising and technical staff.

51. What measures are necessary for the training and improvement of supervisors of all grades and of skilled managers ?

52. What assistance should be given to supervisors, managers and technical experts of private firms to study conditions and methods in other countries ? (See Question 77.)

53. In what circumstances and under what conditions should industries assisted by Government be required to train technical experts ?

nical
ers.

54. Is there a want of uniformity in the standard of examinations for mechanical engineers held in the various provinces where engineers in charge of prime movers are required in certain cases to be certificated ?

If so, should measures be adopted to make such tests uniform so that the Local Governments and Administrations may reciprocate by recognising each other's certificates ?

55. If the law in your province does not require any qualifications in an engineer in charge of a prime mover, have you any criticisms or suggestions to make ?

VI.—General Official Administration and Organisation.

56. What provincial organisation exists in your province for the development of industries ?

What criticism have you to make regarding its constitution and functions ?

57. What organisations do you recommend for the future development of industries in your province ?

Should there be a Board of Industries ?

If so, what should be the functions of such a Board ?

Should it be merely advisory or should it have executive powers with budgetted funds ?

58. If you recommend an Advisory Board, how should it be constituted ?

59. If you recommend a Board with powers, what should be its constitution and how should its powers be defined ?

60. Should there be a Director of Industries ?

What should be his functions ?

Should he be a business man, or a non-expert official, or a technical specialist ?

What other qualifications should he possess ?

61. If you recommend both the formation of a Board of Industries and the appointment of a Director of Industries, what should be the relations between the Board of Industries, the Director of Industries and the Provincial Government or Administration ?

62. What form of machinery do you propose in order to correlate the separate activities of the various provinces as regards industries ?

Is it practicable to form an Imperial department under a single head ?

If so, what should be the functions of such a department ?

age industries.

62 (*a*). Should there be special measures taken or special sections of a Department of Industries organised for the assistance of cottage industries ?

62 (*b*). Please explain in detail what should be the Government policy as regards cottage industries and how it should be carried into effect ? In this connection, see especially Questions 11, 30, 64 and 72.

62 (*c*). What cottage industries do you recommend should be encouraged in this way ?

VII.—Organisation of Technical and Scientific Departments of Government.

ral.

63. Are there in your province any technical and scientific departments which are capable of giving assistance to industries ?

If so, what criticisms have you to make regarding their organisation ?

What changes do you recommend ?

rial depart-
t.

64. In order to aid industrial development do you recommend the formation of any new Imperial Scientific and Technical Departments ?

If so, for what subjects or natural groups of subjects ?

65. How should such an Imperial department be constituted and recruited ?

66. What should be the powers of the head of the department ?

If he has executive control of the department, what should be his relationship to the Imperial Government ?

67. What should be the relationship of an expert, whose services are loaned by the Imperial department to a Local Government, with the Local Government and the latter's Department of Industries ?

vincial Depart-
ts.

68. For what subjects should Local Governments engage their own experts or organise their own technical and scientific departments ?

69. Under what direct control should these experts and departments be placed ?

70. On what terms should these experts be employed ?

nological insti-

71. What is the most suitable way of developing technological research institutions, such as the Indian Institute of Science ?

71 (*a*). Should there be a Technological Institute for each province, and should such Institutes be allowed to develop as independent units or should they be fitted into a general development scheme for the whole of India, with a central Research [illegible]

72. As regards investigation and research should each Institute be general in its activities and interests, or should each deal with limited group of related subjects ?

73. Should there be any Government control ?

If so, should this control be Imperial or should it be purely provincial or local ?

Co-ordination of research.

74. Is it desirable that measures should be taken to co-ordinate and prevent unnecessary overlapping of the research activities in Government Technical and Scientific Departments, special Technological Institutes and University Colleges ?

If so, what are your suggestions ?

75. What noticeable results have followed from the institution of the Indian Science Congress ?

76. Can you suggest any ways in which the Congress might become more useful in assisting industrial development ? (See Question 24.)

Study of foreign methods.

77. What encouragement should be given to Government technical and scientific experts to study conditions and methods in other countries ? (See Question 52.)

Reference libraries.

78. What difficulties have you experienced in consulting technical and scientific works of reference ?

79. Have you any suggestions to make regarding the establishment of libraries of such works ?

Colleges of commerce.

80. Do you think that the establishment of a College of Commerce is necessary in your province ?

If so, on what lines should it be organised ?

81. In what ways do you expect such a college to assist industrial development ?

81 (*a*). In what ways can Municipalities and Local Boards assist in promoting industrial and commercial development ?

VIII.—GOVERNMENT ORGANISATION FOR THE COLLECTION AND DISTRIBUTION OF COMMERCIAL INTELLIGENCE.

Statistics.

82. Have you any criticisms to offer on the present system of collecting and distributing statistics by the Director of Statistics ?

What changes do you suggest ?

Commercial intelligence.

83. Have you any criticism to offer on the present system of collecting and distributing commercial intelligence by the Director-General of Commercial Intelligence ?

What modifications do you suggest ?

Industrial and trade journals.

84. What advantages have you found in the issue of the "Indian Trade Journal ?"

85. Should Government establish or assist industrial or trade journals, either for general or special industries, which would be of real use to persons actively engaged in industries ?

86 What proposals do you make for the dissemination of information of this kind through the various vernaculars ?

Other publications.

87. What advantages have you known to follow the issue of special monographs on industrial subjects or publications like those of the Forest and Geological Departments ?

What measures do you advise in order to increase the usefulness of these publications ?

88. Are there any other directions in which Government could collect and publish information of a kind likely to assist industries and trades ?

IX.—OTHER FORMS OF GOVERNMENT ACTION AND ORGANISATION.

Certificates of quality.

89. Are there any products for which a system of Government certificates of quality should be established ?

For what products should such certificates be compulsory, and for what products voluntary ?

90. What should be the organisation for testing each class of products and granting certificates ?

Prevention of adulteration.

91. Are there any classes of materials for manufacture or of manufactured articles for the adulteration of which penalties should be imposed ?

92. For each such class of goods what organisation do you suggest for purposes of inspection and prosecution of offenders ?

Misdescription.

93. Have any other suggestions to make in regard to the prevention of misdescription of goods generally ?

Trade marks and trade names.

94. What is your opinion on the present state of Indian law relating to marks and descriptions of proprietary and other articles of trade ?

Patent laws.

95. Have you any criticisms or suggestions to make regarding the existing law and regulations relating to patents ?

istration of nerships.

96. Is it desirable and practicable in the interests of trade, to introduce a system of registration or disclosure of partnerships?

ds, railways waterways.

97. To what extent does the lack of transport facilities by road, rail or water hinder industrial development in your province?

Have you any specific recommendations to make?

98. Have you any criticisms to offer regarding railway freights, the classification of goods, the apportionment of risk, and the regulation of rates?

What are your proposals?

99. Are there any railway extensions necessary in your province to develop new or to extend existing industries?

100. Similarly, are there any waterways which should be constructed, extended or improved?

pping freights.

101. Are you aware whether the external trade or internal industries of the country are handicapped by any difficulties or disadvantages as regards shipping freights?

Can you suggest any remedies?

dro-electric wer surveys.

102. What has been done in your province towards ascertaining the possibilities of developing hydro-electric power?

Should further investigation be made in this matter?

102(*a*). Have you any criticisms to make regarding the effect of the Electricity Act on industrial enterprise?

ning and specting rules.

103. What difficulties have been experienced in the working of the Mining and Prospecting Rules (1913)?

104. Are there any minerals that are essential for industries of Imperial importance that ought to be developed at public expense? (*E.g.*, minerals of direct importance for the manufacture of munitions of war, or minerals ordinarily obtained in commerce from one country only.)

est Department.

105. From the point of view of industrial enterprise, have you any criticisms to make regarding the policy and working of the Forest Department?

What suggestions do you make.

106. What measures are practicable to reduce the cost of assembling raw forest products?

107. To what extent is it practicable to concentrate special kinds of these in limited areas?

108. What noticeable deficiencies in forest transport are known to you?

What suggestions do you make for their removal?

competition.

109. Have you any complaints to make regarding competition by jail industries?

X.—GENERAL.

110. What suggestions have you to make for the development of any industry in which you have been actively concerned or interested?

111. Does your experience suggest to you any new industry for which India seems peculiarly suited on account of its resources in raw materials, labour and market?

112. What supplies of raw materials are known to you of which the use in industry or trade is retarded by preventible causes?

What are these causes, and how should they be removed?

112(*a*). Have you any suggestions to make regarding the utilization of waste from raw materials?

112(*b*). Have you any suggestions to make regarding Government aid in the improvement of raw material, such as, cotton, silk, sugarcane, etc.?

112(*c*). What industries in the country are dependent on the importation of raw materials and partly manufactured articles from abroad?

113. Do you know of any supplies of raw materials for which there is a good case for investigation with a view to their development?

Evidence taken by the Indian Industrial Commission, 1916-17

MADRAS

WITNESS No. 200.

MR. J. F. JONES, F.R.S., M.I.E.E., *Chief Engineer, Madras Electric Supply Corporation and Madras Electric Tramways* (1904) (*Limited*).

WRITTEN EVIDENCE.

Official organisatio

With reference to question 56, there is now in Madras the Department of Industries, the head of which is the Director of Industries. The department formerly consisted of even sub-departments, viz.:—

(1) Administration,
(2) Education,
(3) Engineering,
(4) Boring,
(5) Workshop,
(6) Experiments and demonstrations,
(7) Bureau.

Of these Pumping and Boring are now transferred to the Agricultural Department, but it will be seen that there are still sufficient outlets to take up the time and energies of any single man without burdening him with the direction of existing industries. In giving these details, I do not desire to criticise the work of the department, but its constitution in so far as it affords little or no help to the industry I am now concerned with, viz., the Madras Electric Supply Corporation, Limited.

Indian Electricity Act.

In common with the Madras Electric Tramways the Madras Electric Supply Corporation comes under the direct control of Government represented by an Electrical Inspector, who in turn is under the Department of Public Works. While at once disavowing any idea of entire freedom from Government control, it appears to me that, for the prosperity and extension of electric supply business, the existence of some such body as an influential Advisory Board of Industries, through whom well considered schemes or alterations in conditions affecting industries could be recommended to Government, would be beneficial.

I will now give three instances where, in my opinion, amendments of the Indian Electricity Act are necessary:—

The *first* is section 44 covering improper uses of energy by a licensee. We are constantly experiencing trouble with consumers tampering with their meters and we have never yet been able to obtain a conviction, for the simple reason that the section starts with the word "whoever" and our difficulty has always been to prove who "whoever" is, in other words, according to this section of the Act it is necessary to have an independent witness to testify to the actual act of tampering with the meter. The alteration necessary is quite simple, the consumer who signs the agreement for the supply of current should be liable for the intactness of our seals and the general safety of the apparatus installed to measure and control the current he consumes. This would not be a great hardship upon the consumer, but would protect us against tampering.

The *second* is section 23. I consider this section should be recast entirely, as the present ideas of charging for electricity are totally different to what they were some years ago. It is recognised by all the London electric supply companies and municipal bodies that the basis of the charges for electric energy should be the load factor. Load factor is expressed as follows, consumption, i.e., units, multiplied by 100 and divided by the maximum load in kilowatts multiplied by the hours per annum. The section as worded appears to ignore this question of load factor, in other words, it does not differentiate between the ordinary domestic consumer and industrial concerns. In the one case the domestic consumer uses his current for a very few hours during the 24 and at the same time when other domestic consumers are also using current, whereas an industrial concern may use current continuously for 16 and in some cases 24 hours per day.

In practically every business the value of the load factor, i.e., the demand, controls the selling prices. It is more particularly important in an electric supply business, as there is no commercial means of storing, in large quantities, the commodity sold, and it is manufactured to meet the immediate demand.

The alteration to the section should clearly specify that the licensee should base the system of charges for current on the load factor.

The *third* is, rule 60, which reads:—

"The factor of safety of an aerial line, including the supports thereof and any guard wires or bearer wires in connection therewith shall be at least four, under all conditions, the maximum wind pressure being taken at 25 lb. per square foot: for cylindrical bodies the effective area shall be taken as two-thirds of the sectional area exposed to wind pressure."

Owing to the war it is now practically impossible to obtain steel poles. I have therefore been compelled to provide substitutes, and have designed reinforced concrete poles, details of which are shown in the blue print plan * enclosed.

The Electric Inspector to the Government of Madras expressed the desire to test a 30 feet concrete pole to destruction, which was carried out, the pole broke at 977 lb., the pull was applied at the extreme end, the other end being anchored in the ground, the pole was only 32 days old and was undoubtedly green. I raise no objection to the Inspector's Test or method of carrying it out, but would have preferred that the test had been carried out on a pole that was matured, say, 12 months old.

In this country of vast distances it is most important that overhead transmission should be developed to the utmost extent and to obtain this desideratum it is necessary to keep down the cost to the lowest safe limit.

I would draw your attention to the Regulations in other countries and to the fact that overhead transmission has developed farthest in the countries in which the Regulations are most liberal.

The following are briefly the rules in four different countries:—

United Kingdom.—The British Board of Trade specifies a factor of safety (F:S.) of 5, allowing for a wind pressure of 25 lb. per sq. ft. × 0·6 on the projected area of the conductors. No allowance for snow. Temperature 22°F. Minimum ground clearance 20 feet. F.S. for wood poles = 10, for steel structure = 6.

France.— A.F.S. of 3 is called for, with F.S. 5 for road and river crossings. (i) Wind pressure of 25 lb. per sq. ft. × 0·6 at the average mean temperature of the region (average = 50°F.). (ii) Wind pressure 6 lb. per sq. ft. × 0·6 at the average minimum temperature of the district (average = 59°F.).

American practice.—The United States and Canadian recommendations include a maximum stress of 14,000 lb. per sq. in. for aluminium, 30,000 lb. per sq.in. for copper, at a temperature of 0°F., ½ in. coating of ice, and wind pressure of 8 lb. per sq. ft. on projected area of conductor.

Germany and Austria.—The V.D.E. specifies a maximum stress in H.D. Copper of 22,700 lb. per sq. in., and in H.D. Aluminium of 10,000 lb. per sq. in. under conditions—

(i) Temperature of – 4°F., no wind or ice.
(ii) „ + 23°F. with (·128 + ·855 d) lb. per foot ice.
(d = diameter of conductor in inches.)

Supports calculated to withstand wind pressure of 26 lb. per sq. ft. × 0·6 on conductor area. F.S. = 3.

My authority is the British Aluminium Company's pamphlet, dated September 1914, to whom my thanks are due. The pamphlet is herewith enclosed.*

Now, gentlemen, if we are to go ahead and supply power at a low cost which will assist manufacturers in competing with the world's methods of manufacture, it is necessary that the cost of overhead transmission construction be reduced to a lower figure than it is at present. I therefore suggest that the Factor of Safety for the supports for aerial lines be 3 for all road and river crossings, also for all angle work and terminating posts. For straight work, a Factor of 2 should be sufficient. The rest of the formula contained in the existing rule should, I consider, remain unaltered, that is, "the wind pressure of 25 lb. per sq. ft. for cylindrical bodies, the effective area shall be taken as two-thirds of the sectional area exposed to wind pressure."

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* Not printed.

In giving these instances, I trust I have not wearied the Commission with details which may seem trivial or foreign to the main objects of the Commission, one of which I understand to be the fostering of existing industries. I have purposely not made suggestions as to the constitution of an Advisory Board, because I consider that the Commission, with the bulk of evidence before them and if they are inclined to the idea of such a Board, are in a far better position to decide on the question of its constitution.

Speaking with an experience of 10 years in England and 12 years in India, I would however make one suggestion and that is, that in the constitution of an Advisory Board the business and technical members should predominate.

Roads, Railways, etc.

Referring to question 97 of your list of questions, i.e., to what extent does the lack of transport facilities by road, etc., hinder industrial development in your province, I take it that this question includes the non-development of a tramway system, i.e., regarding the latter as an industry *per se*. On behalf of the Madras Electric Tramway Company, I would offer the following remarks.

For many years past we have endeavoured to extend our tramway system to meet the ever increasing traffic, which last year amounted to 18½ million passengers. The number of passengers carried has gone up steadily at the rate of a million per annum since the year 1907, but we have been unsuccessful in our applications to the authorities for increased facilities for laying tracks.

We have been repeatedly called to account for the serious overloading of our tram cars during the morning and evening rushes of traffic and have pointed out to the authorities that we cannot place any more cars on our system, which is a single track principally, but we require additional routes to accommodate the ever increasing traffic.

The Corporation of Madras is most anxious that we should extend our lines to serve the outlying suburbs, which we are quite prepared to carry out, but the system as it is at present may be compared with a railway having a number of branch lines and no main line. The heavy traffic flows in from Triplicane and Mylapore districts to Georgetown in the morning and returns in the evening. Now the whole of this traffic has to pass through practically a bottle neck in the very middle of system. What we require is a main line to relieve this congestion and we have placed before Government our ideas for laying a track right down the Mount Road connecting the Mylapore section and Triplicane section and branching down the Body Guard Road, joining up with our existing track at General Hospital bridge, and another line right across the island joining up our track at the junction of Pophams Broadway and the Esplanade. Various objections have been raised to our proposals, the principal one being, as far as we can gather, a sentimental one, though a technical but not insuperable objection has also been raised about the width of the Government House Bridge, which we have offered to widen at our own cost.

Now gentlemen, we consider one of the principal features of successful industrial life is facilities for taking workers backwards and forwards from their homes to places where they earn their livelihood with celerity and cheapness. The latter condition we carry out, as will be understood when I state that our fares are without question, the lowest in the world, we have even quarter anna stages, i.e., one farthing.

In giving the above concrete example I wish to lay general emphasis on the disability affecting an industry such as a tramway company, which is subject to the direct control and decisions of a Government Department. The existence of such a body as an influential Advisory Board of Industries by whom schemes for industrial extension and improvement could be examined and if found suitable recommended to Government would, in my opinion, be a step in the right direction.

ORAL EVIDENCE, 22ND JANUARY, 1917.

President.—*Q.* I understand that your proposal for the Advisory Board is for the purpose of obtaining something like an independent opinion regarding questions of the kind that you have been raising, where there may be a difference of opinion between people like yourself and say the Electric Inspector, as to whether the rules or regulations, or whether any policy of the Government results in clashing between two distinct industries. You want some board that will help to balance these relative claims. Now there are minor industries, as well as major industries, that have to be considered, and a Director of Industries, would presumably be in some form of charge of all these. I suppose you realise, in connection with the minor industries, that you will want a slightly different kind of advice to the advice given in the case of major industries. Would you then have one Advisory Board, or would you have two, or would you have the Advisory

Board so constituted that the Sub-Committees could be responsible for special industries? —*A*. I think I should recommend Sub-Committees—one Advisory Board and Sub-Committees to deal with the other minor industries.

Q. Would a resolution of that Advisory Board be binding on the Director of Industries, or would the Board mainly be advisory?—*A*. Advisory.

Q. Their views would be put before Government by the Director of Industries?—*A*. Yes.

Q. We can hardly discuss the specific cases that you have raised, but we will accept them as illustrations of your main argument, that we should have some machinery of Government to settle proposals of the kind?—*A*. Yes.

Q. Can you tell us whether you have had experience of aluminium wire conductors?—*A*. No, I have not. We went into it some years ago, but the difference in price between aluminium and copper was very little, when all the special requirements for the larger size conductors were taken into consideration.

Q. Where do you get your cement from for concrete poles; is it made locally?—*A*. No, it is English cement. The difference in price between English cement and local cement is very little and I look upon the difference as being insurance that I get a good quality of cement. I feel more confident about the English cement than I do about the local cement. For years we used nothing else but Madras cement but the quality went down and we had some difficulty with it. It did not set properly and I got rather scared about using it for important work.

Q. I suppose where the cement was being made on a small scale there is likely to be some variation in quality from time to time; that is what you are afraid of?—*A*. Yes.

Q. And the cement industry here has gone through some vicissitudes?—*A*. Yes.

Q. In the north of India they are making cement just as good as any imported cement, according to the information given us. The reason that you have raised this question is, I understand, that some objection has been lodged against your use of these ferro-concrete poles?—*A*. Yes, the difficulty has been that it is a new idea, and the poles have been subject to very close scrutiny which, if we had employed steel poles of similar strength would not have been raised at all.

Q. Do you think a matter of that kind would be settled by an Advisory Board? I presume there is a difference of opinion between you and the Electrical Inspector?—*A*. Not exactly. The Electrical Inspector called my attention to the Aluminium Company's pamphlet and the fact that the difference in the factor of safety is so enormous between English practice and American practice, or even French practice. He said "I have a certain duty to perform ; you quite understand that." I said "I do." "The trouble would be if anything were to occur to these concrete poles I should get into trouble." "Quite right."

Q. So that he has to be on the safe side?—*A*. Yes, he has to perform a certain duty and I consider that he carries it out remarkably well. I have no fault to find with the Electrical Inspector at all.

Q. Your idea is that this is worth reconsidering?—*A*. If the factor of safety is brought to a safe limit, it will cheapen the construction of the overhead line very much and we will be quite independent of steel poles.

Mr. C. E. Low.—*Q*. How far does a question like that which you mention depend upon the opinion of the Electrical Inspector, and how far on the Electrical Adviser to the Government of India?—*A*. The Electrical Adviser to the Government of India drafted the Act originally and I should imagine he feels rather diffident about recommending any serious alterations to the Act. In regard to the Act of 1888, the electrical profession looked upon this as a very effective brake on the whole industry. We electrical men think that the Act ought to be scrutinized every two years and brought up to date. We are advancing by leaps and bounds, and things that were quite up to date one year, we consider, might be put on the shelf the following year.

Q. The point of my question is this; you get an Advisory Committee here, advising Government on a proposition which is brought before them in connection with the Electrical Inspector's work. There are certain things which they can do on their own, but a great many more have to go up to the Government of India, on which Government are advised by the Electrical Adviser. The Electrical Adviser would not be bound or much influenced by the opinion of the local Advisory Committee?—*A*. Well, perhaps not, but we look at it in this way, that it will be advantageous if we get sufficient advice—I won't say pressure—from various bodies. Take the electrical industry right through India, Calcutta, Bombay and Madras; we are forming an association and if we make recommendations to the Electrical Inspector to pass through to Government, we think the Electrical Inspector, or the Electrical Adviser to Government, would be on a very much sounder basis than he is now.

Q. You have a Provincial Advisory Board; is that going to consist of business men or experts?—*A.* I said that, speaking from an experience of ten years in England and twelve years in India, I would make one suggestion and that is that in the constitution of an Advisory Board, the business and technical members should predominate.

Q. Is your firm represented on the Chamber of Commerce?—*A.* Yes.

Q. Have the Chamber of Commerce an Electrical Sub-Committee?—*A.* No.

Q. The Electrical Sub-Committee would deal with electrical questions which the Chamber wish to refer to Government or which were referred to the Chamber by Government. This function which the Board would perform which you point out, seems to me much of the same sort of thing that the electrical trade could do at home, whereas the idea of an Industrial Advisory Board, which has been put before us by most witnesses, is a business board who pronounce on whether propositions are feasible or not?—*A.* It is a different thing entirely. It is more the technical side of questions which is affecting business results.

Q. Don't you think that an Electrical Sub-Committee of the Chamber which works in touch with the Electrical Sub-Committees or other Chambers, would do the work?—*A.* Yes, I quite agree.

Mr. A. Chatterton.—*Q.* Have you any information about the factors of safety used in Mysore?—*A.* I think it is distinctly American practice, the high tension lines between Sivasamudram and Kolar are distinctly on the light side.

Q. What is the voltage on the lines here?—*A.* On the overhead we have only got at present D.C. 450 volts.

Q. With the existing factors of safety do you frequently have accidents on account of poles coming down?—*A.* During the last cyclone a few weeks ago we only had four poles down, due to trees falling on the wires and bringing the wires down. The concrete pole stood right through the cyclone without movement or tremor.

President.—*Q.* Are you using concrete poles?—*A.* No, because we are stopped, on account of the difficulty of getting copper wire.

Mr. A. Chatterton.—*Q.* It makes very little difference whether the factor of safety is three or five?—*A.* It would not make any difference at all. The concrete pole is quite strong enough in the ordinary way, but when the factor of safety comes into consideration it is too weak.

Q. Have you got many industrial users of power on the electric supply system in Madras?—*A.* Yes. We are going ahead very fast, particularly on small motors for flour mills and ginning mills.

Q. Have you any information with you as to the number, and the amount of power they take?—*A.* No, I have not, but I can get it readily for you.

Q. Could you put in a statement showing the charges that are made for electric supply, especially in reference to the industrial use of the power?—*A.* Yes.*

Dr. E. Hopkinson.—*Q.* I understand it is a flat rate?—*A.* Yes. Our trouble here has been that we have been unable to get Government to recognise charges based on load factors. We would like to have a clear basis of load factors for each individual consumer, and base our charges accordingly.

Q. What is the basis of charge now?—*A.* The Madras Electric Lighting Licence is dated 1905. The charge in the first annexure, the charge for energy used for power for each unit is four annas. Then for lighting we can charge eight annas, the maximum rate. That meant separating the wiring for fans from the lights, and having two distinct circuits, which Calcutta is now objecting to. We have only one circuit, but that prevents us from charging separately for fans and lights. Therefore we can only charge a maximum of four annas because the two circuits are combined. Some time ago we applied to the Government of Madras for permission to increase the rates to domestic consumers for lights and fans to five annas for only three years, and their reply was that they thought the charge was sufficiently high, and advised us to increase the price to some of our large power consumers. That is the point we wish to remove. We wish Government to realise that there must be a distinct difference between the domestic consumer and the power consumer. That application to increase the flat rate was made on the 15th of February 1915. We said that the cost of production in Madras was higher than in Bombay (Witness read the letter in question). That is just the thing we wish to avoid. If we could get an increase in our rate to domestic consumers from four annas to five annas, as now the cost of everything is increasing and also the cost of stores, we should get a little money and get out of our difficulties. Our capital was reduced to £120,000 and it will take a revenue of at least £36,000 to make a profit of 5 per cent on the ordinary shares. Last year we made £32,000.

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* *Vide* supplementary written evidence printed after oral evidence.

Mr. A. Chatterton.—*Q.* Is it a fact that in Madras there is a large number of small power installations?—*A.* Not a great number: I think there are only three or four. I do not know of any others.

Q. You are not charging for industrial power?—*A.* No. We are charging one anna *plus* eight rupees per kilowatt on the maximum demand per month. At home the practice is to charge, say one penny and seven shillings or eight shillings per quarter, while the advantage here is by setting the meter once a month, a man reaches the maximum only once a month. The next month he may not reach the maximum.

Q. Do you rate motors before they put in?—*A.* No. Simply on the maximum demand. The old practice was that a man had to pay for the amount of power that he had installed, although he might not use it; for instance a man starts a printing works and says " I will put in a 10 horse power motor now. I will only want seven and the extra power will meet my extensions " ; and he finds he only uses four. The company used to charge him not for four but for ten horse power. The man simply pays on what he actually takes.

Q. How do you ascertain the demand?—*A.* We have a maximum demand indicator, which is reset every month.

Dr. E. Hopkinson.—*Q.* The Electric Supply Corporation is a Statutory Company under the Act?—*A.* Yes. We have to work under the Act.

Q. What is the capital?—*A.* The capital expenditure up to the end of the year ending 31st December 1915 is £456,543 which has been reduced to £120,000 by writing off. The £5 shares have been written down to £3 and they have been split into three £1 shares.

Q. What dividends are you paying on the share capital?—*A.* Nothing.

Q. Have you ever made any payments?—*A.* Never.

Q. When was the Company founded?—*A.* The Company was founded about seven years ago. I have not got the exact date.

Q. 1910?—*A.* A little before, probably about 1908.

Q. Is it an English Company?—*A.* Yes, an English Company.

Q. It is not a Statutory Company then; it is a Joint Stock Limited Company?—*A.* We had to get the concession from the Government here.

Q. What is the date of the Indian Electricity Act?—*A.* 1910.

Q. That is an amending Act?—*A.* Yes.

Q. I understand that the point of your particular instances is that the Act is out of date?—*A.* It is.

Q. And it is crippling trade?—*A.* It is.

Q. In the third instance what is meant by the " rule under the Act "; are the rules subject to amendment?—*A.* We think they are subject to amendment but the Electrical Inspectors met last month in Calcutta and they made certain amendments, and it rests with the Government to accept, or not accept their recommendations to revise the rules. They felt rather chary about making recommendations in regard to rules they made a year or two ago. They think it might look as if they are changing their minds. What we maintain is that we are going ahead so rapidly with the electrical industry that we ought to have the Act scrutinized every two years so as to bring it up to date.

Q. A new Act every two years?—*A.* We do not want the Act altered, but the rules under the Act. One man may come along and say ' I think so and so ' and it would be threshed out, and then we all agree to make a recommendation.

Q. Do you mean rule 60 or section 60?—*A.* No, rule 60.

Q. The rules are not published with the Act?—*A.* I have them in book form by Mr. Meares.

Q. These are rules made under section 35 of the Act. I presume that the rules, which could be varied from time to time, are intended to bring the effect of the Act up to date?—*A*. Yes.

Q. And your complaint is that those rules are not modified from time to time, and are altogether out of date?—*A*. Yes. Look at this clause—section 44—relating to the improper uses of energy. We have a number of cases which we have detected down here. It means extra expense to look after the people. They *will* tamper with the meter, and we have a good deal of trouble. If we could wipe out this word "whoever", just that one word, the trouble would be at an end. Every time we have been to our solicitor with a case, he has said "Have you got 'whoever' that is the man we want."

Q. What I want to get at is why the rules have not been considered; you say the Electric Inspectors meet once a year?—*A*. They have had two meetings, in 1915 and 1916.

Q. And they made a series of recommendations to the Chief Inspector to the Government of India?—*A*. No. The Electrical Advisor to the Government of India was President of the meeting. They made certain recommendations to the Government of India and nothing came of them. We have not heard the result of the last meeting. If the recommendations published in connection with Mr. Meares' speech went through, we should have very little complaint.

Q. Is it the business of the Chief Inspector to present those recommendations?—*A*. Yes.

Q. You probably do not know whether they were ever presented or not?—*A*. I do not.

Q. Or have ever been considered by the Government of India?—*A*. No. The recommendations in the 1915 meeting went up to the Government of India, but nothing came of it.

Q. You go on to deduce from that that the meeting of the Electrical Inspectors did not carry weight; no driving force at all?—*A*. Yes.

Q. And you think that an Advisory Council in each province would carry more weight?—*A*. Undoubtedly.

Q. I should like to ask you how you suggest in Madras such a body being constituted, in order that it may carry more weight than actual meetings of the electrical men from all India?—*A*. In regard to the technical men that meet through India, I shall be on that Committee, and if the Advisory Board is formed here, I shall be only too willing to pass on any recommendations they make with the idea of getting the Act conformable to our requirements

Q. Can you imagine any body constituting an Advisory Board here in Madras carrying more weight on a purely technical matter than the recommendations coming from all the Electrical Inspectors in the country?—*A*. I think the Electrical Inspectors deal with it in this way. There is a certain amount of feeling that we are responsible for drafting the rules. Now these are getting out of date, and they do not think it is quite the right thing that they should alter their own rulings expressed some 12 or 18 months before.

Q. What it comes to is that the Electrical Inspectors really represent the companies which are out to make dividends, and an Advisory Committee would more nearly represent the public?—*A*. What we ask is that if we should go ahead, we should have certain rules and regulations to work under, and that those rules should be really business rules and not rules that hamper us.

Q. I take it that you are to-day being hampered very considerably by these three instances that you quote?—*A*. Yes.

President.—*Q*. I understand that you contend that the Act looks at this question from the restrictive, almost the police point of view, and you want it to be looked at from the point of view of the industries that would be developed on account of the greater facilities?—*A*. We think that Government look upon the Act as "once passed, it is there for all time," like the laws of the Medes and Persians. We say "No; it is not a Criminal Act; it wants to be revised and brought up to date regularly."

Hon'ble Sir R. N. Mookerjee.—*Q*. Have you got a prospectus of your company?—*A*. I have, but not here.

Q. Could you give us an idea what the flotation charges were, and what had to be paid to the Syndicate who floated the company?—*A*. I am afraid I cannot give you that. There is an item in Capital account, 31st December 1915, Engineer's fees and expenses, total amount to end of year was £7,453. That was up to date. I cannot give you figures for flotation account.

Q. What was the amount charged by the Syndicate? The Syndicate was formed first. They must have charged something in addition to the cost of flotation?—*A*. I am not in a position to give you those figures.

Q. It is quite a simple account. Many companies in other parts of India, and the Calcutta Electric Supply Corporation pay most handsome dividends. You say your company has never paid any dividend; can you assign any reason for that?—*A*. First of all the enormous distances to cover. Madras has got over 300 miles of roads and streets, an area of 27 square miles. Georgetown alone has got 37 miles of streets.

Q. Surely your Syndicate must have considered all this before the company was floated?—*A*. That was before we came into the business. I was not here from the very commencement. The history of the undertaking is this Messrs. Crompton & Co. came out here and secured a concession. That concession was taken home, and Messrs. Crompton & Co. handed it over to a city firm who financed it, and the plant was put down.

Q. What was the charge made by the financing company?—*A*. I don't think there was any charge at all; not that I know of. The best of my knowledge is that the company took over the concession from Crompton & Co. on the understanding that Crompton & Co. should equip the whole of the plant. That was carried out.

Q. You are a practical engineer, and have been doing this work for so many years; I take it that you were here from the beginning?—*A*. I was here from 1913.

Q. Don't you think that one of the causes of failure was that the company was overburdened from the beginning?—*A*. I don't think so. There were the enormous distances to be covered. They put copper in the ground where it was not required. We have copper in the streets where we sell very little current. They might have curtailed their expenditure on the mains. The other point is that the reciprocating plant we have had has proved undoubtedly extravagant, and did not wear very well. In those days the turbine was not known in India. Now we have turbines that cut the coal bill in half. These turbines were only installed in 1913.

Q. Then it is not a defect in the Act, but in the working of it?—*A*. I still maintain that if we could charge 5 annas for domestic consumers, and only for three years, as I asked Government to do, it will get us out of our difficulties.

Q. The public will not accept that; in Calcutta they are making a tremendous row, because we are paying practically 4 annas after rebate?—*A*. I thought you had two distinct rates in Calcutta one for fans and one for lights, Calcutta ought to charge much less than we charge in Madras, for this reason that Calcutta is very near the Bengal Coal Fields. They get first-class Bengal coal for about Rs. 8 per ton. I want to point that out, because you cannot compare the two places. I don't think the public would object to 5 annas; it is only an increase of 25 per cent.

Q. Can you obtain a prospectus and send it to the President?—*A*. I will try, but I doubt if we have one in Madras.

(Witness subsequently wrote to say that no copies are available.)

President.—*Q*. Would it be fair now that the public have been taking their electricity for 4 annas to raise the rate to 5 annas?—*A*. The public realise that they have got to pay more for everything, stores, clothing, etc. Everything is going up in price.

Q. So far as electricity is concerned, it is rather the reverse; they are actually cutting down their rates?—*A*. I don't know if you have seen the Calcutta balance sheets. The percentage between expenditure and receipts in Calcutta has been as low as 32 per cent while here we managed last year to get down to 44 per cent. Calcutta had the advantage of being able to get first-class Bengal coal at a very reasonable rate. Here we are bringing Singareni coal from 250 miles away, and this coal is not to be compared with Bengal coal. We have to pay a good deal more than they do in Calcutta, although the coal is of lower quality.

Q. Is it your contention that the Act should be so modified that you would be permitted to charge this higher rate?—*A*. If those words in our licence were deleted (goes up to President with licence and indicates the words) . . .

Q. Would that necessitate any change in the Act?—*A*. No, simply the licence issued under the Act.

Q. Would not the Local Government be the best judge whether these conditions are fair?—*A*. The Government said they thought we ought to increase the rate to power consumers. That is not what we want. We want to increase it to the domestic consumers.

Q. That question has been put before the Government?—*A*. It has. They said, no, they did not consider that that should be so; they thought that the large power consumers should be charged more.

Hon'ble Pandit M. M. Malaviya.—*Q*. Have you never distributed any dividends yet?—*A*. Not on the Supply Company but we have on the Tramways Company.

Q. Is the capital European or Indian, or both?—*A*. Practically the whole of it is European; there are only one or two Indian shareholders.

Q. Was there no condition made, like what has been done in the United Provinces that the capital should be partially subscribed by Indians?—*A*. I don't think so. The share list was opened here at the time. The ordinary M.S.C pound shares could now be purchased for 15 shillings.

Q. Where do you get your supervisors from: have you to import them; or do you employ any Indian University men?—*A*. Yes, we employ Indian University men. We have three or four either from Bombay or Mysore.

Q. From the Victoria Jubilee Institute?—*A*. Yes.

Q. What position do they hold?—*A*. Shift Engineers and Superintendents.

Q. Do you purchase any of your fittings now in the country? In some places they are being manufactured?—*A*. I should not say we purchase any fittings; we make our own. We have our own workshops.

Q. Do you find that the men that you employ pick up the work readily enough?—*A*. Yes, we have no difficulty with labour at all. I might say that some of my men have been with me for ten years.

Mr. A. Chatterton.—*Q*. Is the Madras Tramways Company a separate concern from the Madras Electric Supply Corporation?—*A*. Yes, they are quite separate but some of the Directors of this Company are Directors of the other and the Madras Electric Supply Corporation hold all the ordinary shares in the Madras Electric Tramways Company.

Q. Do they take all their power from the Electric Supply Company?—*A*. Yes, and I think that in time the two concerns may be merged together.

Hon'ble Sir R. N. Mookerjee.—*Q*. Do the Tramways Company pay?—*A*. Yes, we manage to earn a little but we are not in affluence. In 1908 we paid 1 per cent on ordinary shares. In 1909, 1 per cent; 1910, 2 per cent; 1911, 2 per cent; 1912, 4 per cent; 1913, 5 per cent; 1914, 5 per cent; and in 1915, we paid 6 per cent.

Q. So the shareholders of the Supply Company get their dividends from the Tramways Company?—*A*. Yes.

Q. Because they hold all the shares?—*A*. All the ordinary shares.

Q. And the power is supplied by them to the Tramway Company?—*A*. Yes.

Q. So that it is not a fact that the Electric Company is not getting anything?—*A*. The amount of money that the Electric Supply Company get from the Tramway Company won't pay dividends on ordinary shares.

Q. If there was no Tramway Company the Electric Company would have continually suffered loss?—*A*. Yes, undoubtedly; by merging the two together, it was hoped to assist it. The average percentage of the Tramway Company works out to 2·09 per cent.

Mr. A. Chatterton.—*Q*. The Electric Tramways Company is a reconstituted Company?—*A*. Yes, in the first tramways system they had the conduit system, which was a failure. That was 23 or 24 years ago.

Hon'ble Pandit M. M. Malaviya.—*Q*. Are the European subscribers Europeans residing in India?—*A*. I think they are practically all at home.

President.—*Q*. What do they put up altogether, something near a million?—*A*. Yes, over a million.

Q. And for that they have not got more than 2·09 per cent?—*A*. No.

Dr. E. Hopkinson.—*Q*. Your licence is from the Government of Madras?—*A*. Yes.

Q. And the Government of Madras can vary the terms of the licence, subject to the Act?—*A*. Yes.

Q. Have you made application to increase the rate?—*A*. Yes, we made application

Q. What did the Government of Madras do on your application for revision?—*A.* They suggested that we should increase the price to large consumers and not to the general public, the domestic consumer.

Q. The Company did not act upon it?—*A.* No. It was the very thing we don't want to do.

Q. Your own Government, the Government of Madras, has not given you any help at all?—*A.* No. There is one thing that I would like to point out in regard to this tramways question, and that is our difficulty here has been that the tramways are terribly over crowded night and morning.

Q. And the question of your being allowed to use Mount Road; you have placed your ideas before Government?—*A.* I can bring the figures up to date now. The number of passengers carried last year was 20,044,879 which is a record. (Witness here handed to the President a list of the number of passengers carried each year.) People might say that those figures are affected by the date the various extensions were carried out. That is not so. The last extension we had was in March 1911 and March 1912. We have risen from 14 to 20 millions since the last extension.

President.—*Q.* And you cannot automatically proceed to enlarge without some sanction from Government?—*A.* No.

Q. It is Mount Road you are so keen on tackling?—*A.* Yes. If you will help us in recommending the proposal to Government. At present we think the objection is quite a sentimental one.

President.—That we cannot do. They have their own means of judging the value of Mount Road.

Supplementary written evidence forwarded by Mr. J. F. Jones, after oral examination.

Referring to my oral examination I have the honour to state that the actual capital expenditure of the Madras Electric Supply Corporation and the Madras Electric Tramway Company up to 31st December 1915 was as follows, the 1916 figures are not yet available:—

	£
Madras Electric Supply Corporation	633,652
Madras Electric Tramway Company	252,015
Total	885,667

Regarding the enquiry for the charges for power, they are as follows:—

One anna per unit plus Rs. 8 per kilowatt maximum demand; Demand Indicator reset every month; special rates to large consumers with good load factors; Domestic lighting and fans 4 annas a unit, single wiring.

The following are the particulars of the motors connected to date:—

	Number of motors.	B.H.P.
Cement works	8	485
Other industrial motors, such as flour mills, printing presses, pumping, etc.	147	813
Total	155	1,298

Regarding the question about coal, we are using Singareni slack, which cost Rs. 8-15-6 per ton delivered to our power station. This coal is greatly inferior to Bengal coal, but owing to the freight on Bengal coal, Singareni coal is more economical.

"A meeting of shareholders will be summoned on an early date to consider a
"scheme for providing a continuous furnace in place of the present one in order to
"work 2 shifts during the 24 hours. This scheme can only be carried out if the share-
"holders provide funds and the alternative will involve liquidation of the company and
"loss of all money subscribed."

On January 22nd 1912, I wrote to Sir Murray Hammick, K.C.S.I., C.I.E., then Member of Council, asking for an interview and in my letter gave the following facts:—

"On formation of the company Rs. 77,200 was the capital subscribed, in Febru-
"ary 1910 a further amount of Rs. 1,00,000 was subscribed, and Rs. 1,14,130 has been
"expended on machinery, tools and buildings. The monthly outturn of saleable
"bottles from July 1910 averaged for four months 10,000 and as with the labour avail-
"able there appeared no probability of materially improving on these figures it was
"decided to purchase the best type of automatic machines in which compressed air
"superseded blowing by mouth.

"A monthly outturn of 26,000 bottles was reached with these machines, and in
"arriving at this result the company has exhausted all its capital.

"What has been proved is that saleable bottles can be manufactured locally and
"it would seem certain that with further expenditure on a continuous furnace an
"outturn would be reached that would show a profit on working.

"With the present furnace it is possible only to work 8 hours out of 24 whilst
"in a continuous furnace the level of molten metal remains constant and work may
"be continued by working 2 or 3 shifts the whole 24 hours.

"I will not go into further details in this letter, but merely say that there is
"no possibility of shareholders finding the necessary further capital and in order to
"establish an important industry I wish to consult you as to whether Government might
"at this stage step in, take over the factory build a continuous furnace, carry on work
"and hand back as a going concern to the company when the industry has been
"established."

An interview took place at which I explained the position fully. I was informed that Government could not intervene as such action would be opposed to the policy advocated by the Secretary of State.

The company some time later went into voluntary liquidation, as additional capital was not forthcoming.

Such in brief is the history of the Madras Glass Works.

I am of opinion that, at the outset, during the preliminary experimental stage, too much importance was attached by the promoters to the fact that good glass could be actually made in Madras and largely from local materials, whilst too little consideration was directed to local economic conditions such as—

(*a*) Cost at factory of raw materials and fuel
(*b*) Efficiency of labour.
(*c*) Market for factory outturn.

Imported bottles incur freight from Europe to India and are subject to import duty, but such items are not in themselves sufficient to offset adverse conditions inseparably connected with the introduction of a new industry.

I will now refer to matters connected with the history of the Glass Works which would seem to be relevant and to come within the scope of the Commission's enquiry.

1. A mistake was undoubtedly made at the outset in not installing a continuous furnace. Whilst with a full tank our workers could readily take out molten glass on the end of a carrying pipe held almost horizontally, extraction became increasingly difficult as the day went on owing to the level of metal getting lower and lower, necessitating the sloping of the pipe at such an angle that an undue length was exposed to the fierce heat of the furnace and workers' hands were burned.

2. I was informed by the workmen sent out by Messrs. Forster & Sons that the furnace bricks suffered from the effect of the fierce gases in a way that would not have happened had the level of metal in the tank remained constant. Bits of brick became disintegrated and falling into the molten mixture caused breakages during annealing due to the unequal contraction of glass and brick.

This trouble was made greater in that fire bricks obtained from Calcutta had on one occasion been used in repairs to the furnace arch.

3. Experience showed that blowing bottles by mouth is too laborious in India and certainly less efficient under Indian conditions than blowing by compressed air machines.

4. The capital raised was insufficient to set up a continuous tank and to carry on work long enough to prove what could be done with a factory working under conditions best suited to local labour.

I am of opinion that Government help in January 1912 would definitely have settled the question of the cost of manufacturing glass in India under favourable factory conditions, but I am doubtful whether a successful industry would have been established. Certainly the outturn of soda water bottles from six machines worked under European conditions would far exceed the number of bottles imported into Madras.

Messrs. Forster expressed the opinion that economy in fuel could not be attained with a less plant than one in which eight bottle-making machines is employed, the outturn of which in England is 200,000 wine or beer bottles per month. (The average number of soda water bottles imported into Madras monthly over the last four years is 52,968.)

I advocated concentrating work during the comparatively short period the factory was running on soda water bottles, as being the one article most saleable and because I considered it would be detrimental to outturn to do other than specialize for some time.

It must not be implied from this that pressed tiles and other glass articles might not later be made in the factory.

In conclusion I may say that the Government concession of fuel referred to, related to wood growing in the forest in the Cuddapah district and the cost of this fuel to the company when delivered at the factory was practically normal. Inasmuch as the chief item of cost in glass production is fuel, I am inclined to think a factory located in Bengal might be worked better than at Madras, moreover a larger market would be at its doors.

ORAL EVIDENCE, 22ND JANUARY 1917.

President.—*Q.* You have given us a fairly detailed account of the Madras Glass Works bringing out the essential features in the history of it. Failures of this kind are more instructive to us than successes. We have had great difficulty in getting down to the causes of the failures and consequently we value this statement regarding the work that has been done here and the causes leading to the failure of the Madras glass industry. I suppose that you have not gone much into the technical portion of the thing?—*A.* Not at all.

Q. You dealt with it only from the business standpoint of view?—*A.* Yes, and arising out of this I may say that at the interview I had with Sir Murray Hammick I was asked why should Government step in? If the problem of establishing a glass industry is not sufficiently attractive to the Madras Glass Company or to business men, would it not seem unwise for Government to intervene? I will briefly mention one or two points that are overlooked in this question.

(1) In the course of our working a reply made to me by one of the St. Helens glass workmen to my protest that each succeeding month's outturn did not show progress was this. "The works where I am employed in England are managed by men whose fathers and grandfathers were glass-makers; men are working who have been making glass all their lives. You cannot do in weeks what it has taken us so many years to do. Progress must be slow, there will be difficulties and occasional set backs."

(2) I personally realized that the essential condition for success, continuous working throughout the 24 hours would before its practicability was assured entail many disappointments, call for much patience and perhaps necessitate housing workers near the factory.

These thoughts forced themselves upon me as a result of our attempts to work during the night instead of day when we experienced difficulties in getting men to attend. "Long way to come." "Relative sick" and so on were reasons given for late or non-attendance.

In case of Government work the eventual solution of these and other difficulties would benefit the country, if not during this decade later on.

The individual merchant naturally usually looks for a more speedy return on his money. Then also there is the fact that the merchant could not be certain of retaining to himself the benefits of the long training. As soon as success is in sight workers may be attracted elsewhere.

Q. Do you think that Madras is itself the most suitable place for an attempt at glass-making?—*A*. I think not. I think the glass factory must be nearer the source of fuel.

Q. In that case do you think it would be possible to make glass cheaper?—*A*. I think so. The question of a market for the things must also be taken into consideration.

Q. Where would your main market be, would it be Madras alone or other places also?—*A*. Madras itself and other places also.

Q. Is there any other suitable place in the south of India which would be suitable for the purpose. What is your experience in Southern India?—*A*. I should say that I have really not gone into the question of establishing a factory in any other place. The question did not arise inasmuch as when my firm took up the position of agents the factory had already been built in Madras. That is a question which is bound to arise sooner or later, but I am not prepared to say at the moment whether a very much better place in the presidency could have been chosen.

Q. So far as the climate is concerned and the labour problem is concerned there is no difficulty in making glass in Madras?—*A*. We have found no difficulty in regard to that.

Q. Taking into account the question of chemicals most of which are imported and fuel, and the question of finding a market and also having regard to sea freight rates, can you suggest a better site?—*A*. I have not gone into that question. What I did realise was that the immediate problem was to turn out a quantity that would be sufficient to make the factory a success.

Q. That is a very important point. Does it mean that in your opinion the market in Southern India is not sufficient?—*A* It is not sufficient unless we make a greater variety of articles than soda water bottles as we might eventually have done. We had first to organise labour and by concentrating attention on one article to try to attain maximum outturn. Soda water bottles seemed more promising to concentrate on than any one other sort. The Medical Department use a large quantity and variety of bottles and, this and other demands would eventually have been tackled.

Q. What would you advise us in the shape of a practical suggestion so that we might place the matter before the Government? Have you thought whether it would be worth while to take up the industry? Do you find that the local market is big enough and are conditions for the establishment of the industry suitable? That is to say how are we going to make up our minds as to whether it is worth while for Government to take up the industry at all?—*A*. I think with comparatively small expenditure additional to the money already spent Government could have arrived at the cost of glass-making in India under best factory conditions, but whether in light of knowledge gained it would be advisable for the Government of Madras to start a glass factory *de novo* is rather a difficult question to answer.

Q. The glass industry is going on in other parts of India and is fairly flourishing and it seems to be paying especially under present war conditions. The question at present really is whether Madras offers a chance for starting another industry of the kind. Any area that is taken up must be decided on in some experimental way before you can establish the thing. Do you think that the business is one that even now would be worth the while of the Government going into?—*A*. I should hesitate to recommend it.

Q. Is the factory still standing?—*A*. The factory is still standing and I believe was taken over by the Government some time after the company went into liquidation.

Sir F. H. Stewart.—*Q*. You refer to one Mr. Scholl. Was he a German official or was he a German merchant?—*A*. He was not an official. He was German Consul in Madras.

Q. And Mr. Unger?—*A*. Mr. Unger is an Anglo-Indian merchant in Madras.

Q. You say that they raised Rs. 77,000. Was that a private syndicate?—*A*. The Madras Glass Company was registered under the Companies Act. The capital was subscribed privately by friends of the promoters.

Q. How did they start? Was it all the money that they could get?—*A*. I think that probably the promoters thought that sum would be quite sufficient to establish the practicability of making glass and their idea was, when that had been established, to get more money and form a large company.

Q. Looking back would you agree that the capital was quite sufficient?—*A*. It was absolutely inadequate.

Q. And even when the further lakh of rupees was invested it was still not sufficient?—*A*. Insufficient but it was all that could be got.

Q. **Do you think that was the case because the industry had not succeeded?—*A*. I think that would be the answer.**

Q. Was Mr. Meier still here at the time?—*A*. He was here only for a short time. He merely came out to erect the furnace and left the country a few days after glass was made.

Q. Had anyone in your firm any technical knowledge of the subject of glass-making?—*A*. No.

Q. Did Mr. Meier go away before you took over the concern?—*A*. Yes, some time before.

Q. Had you any expert advice or experience at all?—*A*. No.

Q. Where did you get your sand from?—*A*. From a place ten miles to the north of Madras.

Q. Was it satisfactory?—*A*. It was excellent sand. Between the Ennore backwater and the sea there is a very large accretion of such sand.

Q. Had you any German workmen when you took the concern over?—*A*. No.

Q. Who was managing it then?—*A*. Very little work was going on. At the time my firm took over management I was on the point of going to England and I think the people who had been educated by the German workers were carrying it on.

Q. Were they Indians?—*A*. Yes.

Q. They had no previous knowledge of glass-making or anything of the sort?—*A*. They had no previous knowledge. There was no difficulty in turning out the soda water bottles on which we were engaged. The difficulty came in when we found that we had to spend Rs. 500 a day for turning out Rs. 100 worth of glass.

Q. What do you attribute that to? Is the labour suitable and are the climatic conditions good?—*A*. It is certainly hot in Madras. But I do not think that climatically there is any difficulty. After all the heat that you get in the furnace is so great comparatively that ten or twenty degrees variation in the surrounding atmosphere does not count for much.

Q. You say that you are very doubtful whether a successful glass industry could have been started here?—*A*. Yes. I should hesitate to recommend it. As regards starting a new glass industry on purely commercial grounds, I can positively say that I would not recommend it.

Hon'ble Pandit M. M. Malaviya.—*Q*. You say that soda water bottles imported during the last four years averaged 52,968. What would be the price on an average?—*A*. The average price at the time when we were working the factory would be for small bottles Rs. 12 a gross and for the larger bottles about Rs. 18 a gross.

Q. You have here the sand available, the labour available and the market available. Don't you think that the Madras Presidency will consume the whole of your outturn and more?—*A*. I think that it consumes 52,000 bottles a month.

Q. Therefore the sand being available the labour being available and the market being available, do you think that the Government should go into this enterprise and establish it on a sound business footing?—*A*. There may be other places more suitable than Madras. That is my only reason for not answering the question in the affirmative.

Q. But having regard to these three factors, the presence of the raw material, the labour and the market, don't you think that Government would be justified in going into the industry with a view to putting it on a sound business footing?—*A*. I think the chief difficulty is that of cheap fuel. I hear that there is an idea of starting a factory in Bengal where cheap fuel is obtainable. You get cheap coal there and if that factory is started, I am sure we would not be able to compete with it.

Q. That may be if it was the enterprise of some private firm which may have to give a large return. But for the people of the presidency who have got the labour and the market would it not be an advantageous thing to start an industry here?—*A*. I think that if a factory is started in Bengal the Government here would be wrong in establishing a factory here. The factory in Bengal would be able to undersell the Madras goods and the factory here would not be able to compete.

Q. Because of the cheapness of the coal?—*A*. Coal is very important and expensive factor in the working of the factory.

Q. And you cannot think of any other means of supplying the necessary fuel?—*A*. I think coal is the cheapest fuel.

Mr. C. E. Low.—*Q.* Supposing Government took up a thing [illegible] avoid the kind of mistakes that have characterised such ventures in [illegible] ask one definite question. Suppose the St. Helens man had come out in [illegible] when the factory was started first, would he have avoided many of the [illegible] were committed, namely he would not have permitted a non-continuous [illegible]—*A.* Certainly.

Q. And you also think that the use of these unsuitable bricks might have been prevented?—*A.* Experts attach the greatest importance to the right kind of bricks. That point was impressed upon me very much. There are difficulties in the case of bringing out experts for close industries, such as glass-makers are chary about giving away secrets.

Q. I understand that there was at one time a bottle-making machinery trust and anybody who wanted to buy bottle-making machinery ought to be a member of that trust. Have you come across that kind of thing?—*A.* No.

Q. The question resolves itself then into one of the right kind of expert and the difficulty of getting him?—*A.* I think that difficulty is not insuperable. I think that if I had been continuing and if Government had advanced the money I could have gone on and that I should have largely followed the advice of this firm Forsters. They would have constructed a continuous furnace and I should have stipulated that the two men sent out who were very excellent remained until manufacture was made a complete success.

Q. We understood from a previous question that Calcutta has the additional advantage of having cheap coal in addition to the market and that you are doubtful whether the Madras market by itself would be able to find sale for all the bottles?—*A.* That is so.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* How did this factory get into the possession of Government?—*A.* The company went into liquidation and the factory was acquired by a private individual who subsequently sold it to Government.

Q. You say that there was some trouble about the workmen? What was the trouble?—*A.* The only trouble was that we could not get with Indian labour anything like the outturn that is got with European labour. All I meant was that it would take very many years to make the Indian workmen as efficient as the English workmen.

Q. What is the pay that these Indian workmen get in comparison with the English workmen?—*A.* I do not know what a glass blower gets in Europe. The men here are paid Rs. 15 a month.

Weaving.

Mr. A. Chatterton.—*Q.* You have experience in connection with the manufacture and export to Europe of Madras handkerchiefs?—*A.* We have shipped a large quantity.

Q. There was also a similar trade conducted from Madras in what are called lungies which go to Singapore. Have you got any experience of that?—*A.* I have no experience.

Q. Do you remember the maximum value of this export trade in Madras handkerchiefs?—*A.* I think about 5,000 trunks a year. The value would be nearly a hundred thousand pounds sterling a year.

Q. Are these Madras handkerchiefs made on the country loom?—*A.* Yes.

Q. Can you tell us what stood in the way when experimenting with improved looms with a view to getting a better outturn?—*A.* We imported a loom called the Hattersley about six of them. That loom was operated by the feet. It was practically a [illegible] lower loom, although much lighter. We were told that it had worked very successfully in several countries on the Continent. The speed was from 200 to 250 picks a minute which, of course, was quite good. Our experiments with this loom were not successful. The difficulties that we experienced were that the loom was very much heavier to work than the country loom and there is a greater strain on the yarn used. We experienced constant breakages and eventually gave up any idea of making use of the looms which were finally handed over to the Industries Department. I do not know what they did with them.

Q. Do these Madras handkerchief looms do high class weaving?—*A.* [illegible] do, of course.

Q. Do they call for special skill?—*A.* The best quality is made in the [illegible] about 20 miles from Madras. These handkerchiefs are the best and it is [illegible] difficult to get that type in any other part of the presidency. [illegible] particularly efficient and the craft seems to have been handed down [illegible] for many successive generations. So much so that attempts [illegible] equal [illegible] have not been successful. After [illegible] [illegible] "fine" and [illegible] handkerchiefs as yet.

Q. These handkerchiefs are sent to London and sold by auction?—*A*. They were formerly sold by auction. The auction system has now disappeared.

Q. Do you get these handkerchiefs from the traders or the weavers? What organization have you got to secure a continuous trade?—*A*. We make our contracts with a middleman and have to advance a considerable portion of the value of the order. This middleman in turn distributes the money to the weavers, also gives them yarn and later collects the goods.

Q. Have you had any considerable trouble in recovering the advances?—*A*. That is one of the great difficulties connected with the business. In the case of an advance in values the weaver has often disposed of our goods to others for better prices, but the difficulties in tracing goods, although one would like to prosecute for non-fulfilment of contract, are too great in actual practice to succeed.

Q. Do you think it would be advisable for the weaving department of the Department of Industries to make further experiments in this direction with a view to get over the difficulties connected with the manufacture of this particular class of goods?—*A*. I think that it is a matter for the department to consider. I am doubtful about the point. As I say it is really due to hereditary skill in any particular district. If the department set itself to improve outturn and quality of these goods it would be a matter of persistently and patiently working without expecting any great immediate results. That would be a matter for the Government to consider.

Q. Have you got any experience of the trade with the Straits?—*A*. I have no experience of the Straits trade.

Q. Are you aware whether the fly shuttle loom has been largely taken to by the weavers in the Madras Presidency in recent years?—*A*. It has. I believe that lungies as well as handkerchiefs are now largely made on fly shuttle looms.

Q. In your experience in dealing with the weavers do you find that there is difficulty in disposing of their goods and that is an important reason why they are averse from putting money into improved methods? Do you think that there is not sufficient organization among the weavers?—*A*. I am afraid I have no personal knowledge of the subject.

Q. Can you say how many weavers are employed in this handkerchief industry.—*A*. I have not got the figures with me.

Q. Roughly?—*A*. I should think that one weaver would turn out one piece of handkerchief in about five days. There are 64 pieces in a trunk. I should think there are five to ten thousand weavers making Madras handkerchiefs. I must say that I am speaking rather offhand. I should be glad to put in a note.

President.—It is a very important matter. If you could look up the necessary data and let us have a note we shall be glad to have one.

WITNESS SUBSEQUENTLY FORWARDED THE FOLLOWING :—

Note on Madras Handkerchiefs.

Some 4,000 trunks of Madras handkerchiefs valued at about £80,000 are shipped annually to London and thence principally to the West Coast of Africa and the West Indies. This business goes back to the days of the East India Company.

Up to 20 years ago public sales were held in London quarterly at which these handkerchiefs were sold by auction.

Of late years direct orders have increased and auction sales no longer take place.

Prices have ruled from 4*s*. to 8*s*. a piece for ordinary plain weaves whilst a small demand has existed for goods woven with a dobby effect decorated with raised work and embroidery, prices of such running from 10*s*. to 20*s*. a piece.

These goods are woven in hand looms imported cotton yarns being used, usually 60's warp and 40's weft.

The superior qualities which are woven in Arni, Sattiyavedu and surrounding villages have a very distinctive and artistic appearance.

For many generations production of these goods has led to so practical a knowledge being acquired of various details pertaining to treatment of yarn, dyeing and weaving, that the weaver is a highly skilled craftsman as far removed from the ordinary power loom or even hand loom plain goods weaver as the sculptor is from a common stone mason.

It is very necessary to keep this in mind in considering schemes for increasing production or introducing manufacture of such goods in any new district. The common qualities have been for some time produced in the Cuddapah district where I worked patiently for over ten years before arriving at a satisfactory standard. These hand loom goods command much higher prices than English power loom productions although reports that mill goods are gaining ground, particularly in the common qualities, have been increasing for some time.

It is customary here to contract with a middleman for one's requirements, a contract usually being for quantities varying from a single trunk to several hundred trunks for delivery within two to eight months. Middlemen are either successful weavers or, if not weavers by caste, men who have acquired influence over a weaving community or who have perhaps such intimate knowledge of a particular group as to enable them to get goods made.

It is usual to advance one-third the cost; thus in contracting for thirty thousand rupees worth of handkerchiefs an advance of Rs. 10,000 is given, the next payment being for goods delivered after one-third the order has been completed.

In a stationary or downward market contract time is usually kept and quality of goods is correct.

In a rising market contract time is often exceeded, the ostensible reasons being, too frequently, merely excuses of many kinds to cover laches on the part of suppliers or weavers in secretly giving preference to competitors subsequently booked and higher price orders.

Special designs may have been ordered at the instigation of the African trader in anticipation of an expected season demand, and unfortunately for the original contract buyer, as delivery time becomes due, should the market have advanced or signs of active demand become manifest, suppliers find no difficulty in readily making sales outside at higher prices.

More than once it has happened that the pick of a lot has been so disposed of whilst tardy delivery is made against contract. The buyer may only hear of this stolen march months and months later from the irate indentor in Africa and too often it is then impossible to trace and unravel the facts much less get any satisfaction. A buyer not infrequently has delivered to him goods which, whilst in the matter of quality are at the time of delivery (owing perhaps to active demand for a particular style) worth more than contract price, are really inferior to contract standard of quality. Too often an allowance cannot be obtained and the buyer cannot afford to let goods go to a competitor and insist upon re-manufacture as the buyer's market would be spoiled by competitors getting in first with his designs.

"Capping," or making the outside handkerchief of the piece of better quality than the inside, is not infrequently done. The standard of quality is weight of the piece which runs from 24 ounces (common) to 30 ounces (superior).

Instead of using throughout in the weft 40's imported yarn, often the red weft stripes in the inside handkerchiefs are made of country dyed and spun 20's yarn.

This allows of fewer threads being put in or the piece made 8 to 9 inches short and yet weighing correctly and quality apparently on a superficial examination of the top handkerchief all right.

It will have been gathered from the remarks preceding this that the merchant's difficulties are not solved by a detection of such irregularities inasmuch as he cannot always afford to reject goods. It is often indeed a matter of difficulty to decide when and where to draw the line. Of course the merchant during a time of poor demand is often able to insist upon allowances for goods not up to standard or to obtain some measure of satisfaction, a business amounting to £80,000 per annum could hardly be maintained were it always a case of "heads I win tails you lose."

If it were possible to abolish the custom of "advances" and to insist upon a penalty clause for non or imperfect fulfilment of contract the difficulties referred to would disappear. In actual working however I have not found it possible to introduce such reforms.

I do not know how Government can help; I merely bring forward certain difficulties that it may be realized how seriously a merchant is handicapped in this business in not being able to obtain the co-operation which is essential to development.

I am convinced that if only honest co-operation could be ensured on the part of supplier and weaver the hand loom weavers' interests might be considerably developed.

It may be interesting to note that the fly shuttle loom introduced by the Industries Department some ten years since has been more and more coming into use in handkerchief weaving, and today I think that over 80 per cent of handkerchiefs woven are on such looms.

WITNESS No. 202.

MR. GHOSE, F.C.S., F.G.S., M.I.M.E., *Mine owner and Economic Geologist Gooty R.S.*

WRITTEN EVIDENCE.

Capital.

Greatest difficulty is met with, in India, in interesting financiers in mining enterprise. However sound the proposition may be, in India, except coal mining, all mining propositions are regarded with extreme suspicion. This is no doubt partly due to speculation in the past as well as failures. Pseudo-experts are so common in India and their activities are so widespread that honest men with sound propositions are regarded as speculators and fail to obtain even a hearing from the capitalists in this country. Only those capitalists—and their number is extremely limited—who have profited from their investments in mining business, take some interest in mining propositions. But they also frequently give preference to other propositions such as the exploitation of agricultural products.

Capitalists in India, with few exceptions, have very little knowledge of and take little interest in mining. The success of the coal mining industry readily attracts capital. But the prospects of soundly organised metalliferous and non-metalliferous mining industries are almost unknown to the capitalists in India. These branches of the mining industry are the most neglected and undeveloped in this country. Where of sufficiently large scale, they have attracted capital from Europe. But small scale industries pioneered by small capitalists have either failed for want of sufficient capital or sound organisation or both or are struggling for their existence.

While plenty of capital is forthcoming for the development of coal mining, jute, tea and other agricultural industries, banking in India is not sufficiently advanced to render financial aid to ordinary mining propositions other than coal. Most of the manganese and mica mines have been worked by small capitalists in the beginning and the development of these concerns was greatly hampered by lack of capital. Pioneer workers in the field have often been obliged to hand over their interests or to close their mines on account of their failure to command capital to withstand the competition by their neighbours who were attracted by their own enterprise. Banks in India will not grant any loan on the security of mining property or stocks of ore, while it is easy to obtain such financial assistance for agricultural produce. While leading banks in Europe retain or can readily secure the services of consulting geologists or mining engineers to report on mining propositions brought before them even from remote parts of the world, banks in India possess no such agency as they entirely ignore mining industries other than coal. Thus the control of some of the most important mining concerns has passed into foreign hands.

As a rule, it is only men of high standing and influence who can command capital, even if their propositions are worthless. Pioneers of mining industries and small capitalists in India have often to put an end to their activities on account of discouragement and want of capital and proper guidance and the development of a number of promising mining industries has thus been checked.

It is rather difficult to suggest any means for the removal of the difficulties which confront the small mine owner in India, as so much depends on circumstances which greatly vary. But as the declared policy of the Government is the encouragement of the development of industries in India and as mining is the second basic industry in the world without the development of which no country can progress sufficiently, I think the establishment of an Imperial Department of Mines to develop the mineral industry of India, will go far towards the solving of the difficulties to some extent. The present Geological Survey of India, if expanded into a combined Department of Mines and Geology, should answer the purpose I do not see the necessity for a new department, as the Geological Survey with its vast experience and knowledge of the mineral resources is already in a position to materially assist in the development of the mineral industry of India. The existing part of the present organisation should continue the investigation of the stratigraphical and structural geology of India and its Mines Branch should exclusively deal with all aspects of economic geology and should institute special investigation of all occurrences of economic minerals with a view to their development where warranted. There should be a Provincial Geologist in each presidency and province (perhaps with the exception of Bombay and the Punjab) including Baluchistan and the North-Western Frontier Province. Besides, carrying on a survey of the economic mineral resources of his province, it will be one of the duties of the Provincial Geologist to investigate every mineral occurrence capable of development brought to his notice by pioneers or discoverers or holders of prospecting licenses or mining leases who require assistance and advice for development. The Provincial Geologist should report to the Director of the Department of Mines and Geology and also to the provincial Government on the prospects of the development of such deposits and should the Director form a favourable opinion as to the mining project, necessary assistance may be rendered by Government on his recommendation. Of course, the Provincial Geologist will have to be a specialist capable of forming sound conclusions as to the prospects of a mineral find. When once the deposits are prospected and their value proved under the guidance of the Provincial Geologist, it may not be difficult to finance the undertakings. It is in the prospecting stage that the small capitalist is mainly hampered by want of sufficient funds for prospecting and for exploiting his produce. The difficulty of finding a market and the right type of buyers has often retarded the development of mineral industries in India. A Department of Mines can give much assistance in this and many other directions. Such a department is bound to stimulate the mineral industry, the importance of which is hardly recognised in India. In my opinion, the need for such a department properly staffed, is very great and urgent.

Government assistance

In my opinion, much good may result in giving Government aid in the shape of money grants-in-aid, bounties and subsidies, loans with or without interest, supply of machinery and plant on the hire-purchase system, provision of part of share capital of companies and guaranteed Government purchase of products for limited periods, provided that such aid is rendered only on the merits of each case to highly deserving industries. Such aid should be given only to pioneers of important industries and to small capitalists and not to those who can command capital. Well-established industries should be excluded from such grants. When there is a possibility of opening up the country and developing a new mineral industry to the benefit of a Province, financial aid by Government to defray partly the cost of prospecting or of machinery or to cover freight, may be granted to small capitalists who will be able to support with evidence their claim for such assistance. In the case of industries of national importance, Government may guarantee dividends after proper investigation. Government should grant financial assistance only on the merits of each case irrespective of the financial standing of the promoters provided they are honest and their project is sound.

The grant of bounties and subsidies ought to stimulate the inception and the development of new industries. Such grants have led to the establishment of industries of far-reaching importance in other countries such as Canada and Australia. But India has very few captains of industry and so long as their number and spheres of activity are limited, little good will result from the offer of bounties. In my opinion, the grant of bounties and subsidies may lead to new developments in the mineral industry of India. Such assistance is necessary and may very appropriately be granted for the establishment of metallurgical industries, such as, the manufacture of iron and steel, ferro-manganese ferro-chrome, aluminium, tungsten, lead, etc., and also for chemical industries such as the manufacture of sulphuric acid, cyanide, calcium carbide, sulphate of ammonia, alumina, aniline colours, etc. Industries of national importance should have the first claim for bounties. A number of mineral industries can be started with success in India provided these industries receive grants of bounties or subsidies or they are protected from foreign competition. Under normal shipping conditions, an extensive export trade in iron-ore is possible provided bounties are granted at the early stage of the industry.

When Government give financial assistance on a large scale to an industry, Government control will be necessary to ensure proper expenditure of the amount granted and for the efficient organisation of the industry for its success. The failure of many industries may be traced to heavy outlay on buildings and wrong type of machinery and the handling of the business by incompetent men. The appointment of Government directors will go far to remedy these defects. When Government guarantee dividends or grant heavy loans or provide part of the share capital of companies, Government directors must be appointed. In other cases, such as the grants of small amounts of money, loans with or without interest, supply of machinery and plant on the hire-purchase system, Government control should be confined to an audit of the accounts only.

Pioneer factories.

I have no direct personal experience of Government pioneer factories. But so far as I am able to judge, I think such factories have done much good for the industrial development of the country. However the growth of the pioneer factories has been so far, very slow and only a few such factories have been established within the last decade. In this country, lack of initiative and knowledge of industries on the part of the people being so conspicuous, the pioneering of industries by Government is a necessity. Pioneer factories should be started after thorough investigation by real and not supposed specialists. Makeshift arrangements and false economy must be rigidly avoided. "The right man in the right place" the neglect of this elementary principle of industrial success, is the cause of the failure of a very large number of Indian industries.

A pioneer factory should be closed when the feasibility of the undertaking has been sufficiently demonstrated and when similar industries are started by private capitalists or companies and as soon as there is any likelihood of competition with the latter. When the success of a pioneer factory is well-established, it may be handed over for private or company management.

The main object of pioneer factories should be to demonstrate the possibility of starting new industries to check the import of foreign articles capable of being manufactured in India. Industries for the manufacture of finished products from Indian raw materials, which can be exported with profit in competition with those now being manufactured in Europe from Indian raw materials, should be investigated. I do not see why Government should not undertake the pioneering of metallurgical or chemical industries similar to those inaugurated by the Canadian Government. It is in this direction that results of far-reaching importance may be achieved, although the cost of such undertakings will necessarily be high. Experimental stations for the investigation of the prospects of chemical, metallurgical and mineral industries ought to be opened by Government as early as possible.

Financial agencies

It is possible for existing or new banking agencies to give material assistance to mining undertakings—

(1) by relaxing the present rigid treatment in favour of more sympathetic attitude for mining propositions by small capitalists;

(2) by securing the services of competent geologists and mining engineers to investigate and report on mining propositions;
(3) by granting loans for the development of sound propositions or for the purchase of machinery;
(4) by granting advances against consignments of ores or mineral products;
(5) by advancing freight charges as in the case of agricultural products;
(6) by granting loans on the security of stocks of saleable ore.

Limits of Government assistance.

Government aid, when it competes with existing industries or discourages fresh, private enterprise, should be discontinued. When there is a complaint of competition, the party affected by Government assistance to a rival undertaking should approach Government with a full representation of their grievances and if a sufficient case is made out, then Government will cease giving assistance to prevent undue competition or to discourage private enterprise.

Technical aid.

I have had no experience of technical and scientific aid provided by Government, as I do not know whether there is any organization in this presidency capable of rendering aid to any mining industry. I have received assistance from the Geological Survey of India and from the Commercial Intelligence Department. Researches conducted by the Geological Survey on the mineral resources of India, have led to very important developments of the mineral industry of this country. The present position of the coal, petroleum, manganese, mica, and tungsten and other industries is due to the investigation and the publication of the researches conducted by the members of the Geological Survey of India. The manganese mining industry of the Bellary district, which has given employment to thousands of poor labourers in the arid region embracing the Bellary and adjoining districts in the Bombay Presidency, during the last decade, would not have been brought to existence but for the discoveries made by me on the basis of the clue supplied by the late Mr. Bruce Foote of the Geological Survey. As the result of the discovery of extensive deposits of manganese-ore, a very backward part of this presidency has been opened up by about 20 miles of railway, relief has been given by employment in the mines to a considerable percentage of a famine stricken population, to say nothing about the starting of an important new industry in Southern India, which has very considerably added to the income of the Sandur State, the Madras Government, the railway and steamer companies concerned. The present extension of the Marmagoa Harbour is the result of the direct influence of the large export trade in manganese. The researches of Dr. L. L. Fermor of the Geological Survey have greatly stimulated the manganese industry of India.

The loan of Government experts may be given on the merits of application by private firms or companies. Generally, such assistance should be freely given for industries which are likely to assume far-reaching importance. Expert assistance may also be given to minor industries of special importance. The conditions governing the loan of Government experts will vary according to circumstances. When private firms or companies are capable of defraying the salary and expenses of an expert, they should be made to bear such charges. But small capitalists should be given expert assistance free of charge when their undertakings are of sufficient importance. When expert assistance is likely to lead to the establishment of an important industry capable of wide development by a group of capitalists working independently, such assistance may be given free. In all cases, the expenses connected with the actual investigation of an expert should be borne by private firms or companies.

The publication of the results of researches made by a Government paid expert while attached to a private enterprise, should be governed by conditions peculiar to each case. Purely technical details which do not entail the disclosure of any specially designed machinery or process of confidential nature may be published. Business secrets which if disclosed, may affect the interests of a firm should not be made public. When the publication of details is likely to engender unfair competition to the pioneers of an industry, the results of research should be entirely withheld. When there is no objection by industrialists to the publication of the results, researches may be freely published.

Demonstration factories.

Demonstration factories for the following industries may be started with advantage in the Madras Presidency:

(1) Oil-pressing, (2) Essential oils manufacture, (3) Soap manufacture, (4) Fruit canning, (5) Manufacture of synthetic drugs and perfumes, (6) Manufacture of Salicylates from Gaultheria Odorotissima, (7) Manufacture of Thymol (8) Potassium Bichromate manufacture, (9) Potassium permanganate manufacture, (10) Manufacture of bleaching powder, (11) Manufacture of pharmaceutical products, (12) Glass blowing, (13) Medicine bottle manufacture, (14) Manufacture of glass chimney, globes and ordinary glassware, (15) Manufacture of enamelware, (16) China-clay goods manufacture, (17) Manufacture of cutlery and surgical instruments, (18) Lock manufacture, (19) Hurricane lantern and table lamp manufacture, (20) Manufacture of bell-metal ware, (21) Manufacture of glass bangles, (22) Manufacture of shell bangles, (23) Manufacture of paints, colours and varnishes, (24) Manufacture of scientific instruments for science teaching, (25) Wood distillation.

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Holland, Mr. Theagaraya Chettiyar, of the Southern India Chamber of Commerce, spoke about the poverty of the mineral resources of Southern India. I venture to state that such opinions are erroneous. After 12 years' pioneering work in Southern India, I do not think that it will be an exaggeration to say that this is one of the most important mineral provinces in the world and if its richness is not known, it is for want of exploration and ignorance.

The work of the Geological Survey has apparently been greatly hampered by want of sufficient funds and inadequacy of staff. In addition to the present staff, I suggest the appointment of a special staff for the sole purpose of carrying on a survey of economic minerals and the development of the mining industry. As already suggested in the beginning of this statement, I advocate the enlargement of the present Geological Survey into a Department of Mines and Geology with the following additional staff with the exception of the Director:—

(1) Director of Mines and Geology.
(2) Assistant Director of Mines
(3) „ „ Geology.
(4) Economic Geologist in charge of the division of Metalliferous Minerals Research.
(5) Assistant Economic Geologist.
(6) Chemist.
(7) Economic Geologist in charge of the division of Non-metallic Minerals Research.
(8) Assistant Geologist.
(9) Chemist.
(10) Economic Geologist in charge of the division of Research in Fuels.
(11) Assistant Geologist.
(12) Economic Geologist in charge of the division of Building Materials Research.
(13) Assistant Geologist.
(14) Chemist.
(15-23) Provincial Geologists, each with a subordinate staff of
One Chemist,
Two Prospectors,
One Boring Foreman,
Four Explorers,
Six Scouts.

I have endeavoured to roughly outline the organisation of the Mines Branch as above. Among the present officers of the Geological Survey, those who are specialists in economic geology should be transferred to the Mines Branch. The others will continue their geological work. Should the cost of the above scheme be prohibitive, only the Provincial Geologists with their subordinate staff, should be appointed to complete the mineral survey. The Provincial Geologists should carry on the economic mineral survey of their respective provinces under the direct control of the Director. They should undertake extensive exploratory work. All important mineral occurrences should be examined and reported upon. Trained prospectors and explorers should be engaged. Where approved by the Provincial Geologist, prospecting work should be started to ascertain the value of important deposits, if possible. The survey should be extended from district to district. The scouts should be trained for collecting specimens. Village officers should be ordered by the Collectors to report all known mineral occurrences to the Provincial Geologist. All important occurrences should be investigated by the Provincial Geologist himself.

The precise objects of such a mineral survey should be

(1) to complete as far as possible, the work of the Geological Survey so far as economic geology is concerned;
(2) to extend the knowledge of economic minerals with a view to the establishment of mining industries; and
(3) to publish all informations regarding the value of the mineral deposits located.

The result of such surveys, if made widely known to parties interested in mining, will be a great incentive to the expansion of the mining industry.

I venture to suggest a thorough and very early investigation of the following by the Geological Survey of India:—

(1) Iron-ore deposits of India,
(2) Copper-ore deposits of Singbhum,
(3) Lead-ore deposits of the Cuddapah district,
(4) Bauxite deposits of India,
(5) Phosphate deposits of the Trichinopoly district.

Exhibitions

The educative value of industrial exhibitions is very great. Such exhibitions never fail to interest even ordinary people in industries. Exhibitions are the surest medium for creating popular interest in the possibilities of developing industries. They assist in forming new ideas and in widening the industrial horizon.

Either Government should themselves hold periodical exhibitions or encourage private agencies to do the same. The promoters of such exhibitions should be financially assisted and Government grants or rewards should be freely given for new industries or inventions of merit.

Industrial exhibitions should be of a demonstrative nature besides including displays of raw materials and manufactured products.

Exhibitions should be popular in character to educate the masses and to excite general interest in industries. They should not merely aim at bringing buyers and sellers into contact although this should be one of the principal objects.

Land policy.

The development of the mining industry is frequently hampered in the Madras Presidency by the inamdars and the pattadars who either retain the entire or partial possession of the mineral rights. Government do not exercise any control over their mineral rights and mining in such lands is not regulated by the Mining Rules of the Government of India. The result is that these lands are frequently withheld to hamper the development of the mining industry. The inamdars and the pattadars often demand most exorbitant terms for the mining of minerals in their lands. I do not understand why Government do not at least interfere in the case of the holders of patta lands who derive their rights from Government. It is often difficult and sometimes impossible to induce a pattadar to even allow a passage through his land for the transport of minerals. Such unwarranted obstructions ought to be removed by Government, as these retard the progress of the mining industry to a very appreciable extent. I think Government should allow free use of waste lands for at least a limited period, for the development of new industries.

Training of labour.

I have found from experience that the grant of special rewards often lead to the improvement of the miner's efficiency. Such rewards have produced healthy competition among the mine coolies and consequent increase of the output. Rewards in the shape of clothes, blankets, etc., are more appreciated than presents in cash. In my steatite mine, I used to feed the coolies and their families on the completion of each consignment of steatite and on important festival days. This led to a marked improvement in the attendance and the work of average coolies. In the diamond mine, my giving a silver bangle to the sorters for finding 12 diamonds, made them improve their efficiency in sorting and not a single case of theft occurred.

A great deal depends on the training given by supervisors to the labourers. So far as my experience goes, the South Indian labourer, if trained and encouraged sufficiently, develops considerable amount of efficiency.

To impart any sort of education to the labourers with whom I have to deal, is out of question. They belong to the most backward classes in the presidency. Most of them have long ago passed the school going age. They have no inclination to be educated in any way, although some of them are willing to send their children to the school only to give them a better start in life and not to turn them into labourers. So far as I have studied the question of improving the efficiency of the mine coolies, I think much can be done by demonstration and lantern lectures. Ordinary night schools are out of question in the case of such hard worked labourers. As for the children of the labourers, although I recognise the value of compulsory education (primary), I think it will produce only a discontented class of men averse to manual labour.

Official organisation.

There is a Department of Industries in the Madras Presidency. So far as I am aware, it is not in touch with the mining industry. Either mining is not apparently recognised as an industry by this department or the mineral industry is outside its scope of operation. In any case, the activities of this department are very limited.

For the future development of industries in the Madras Presidency, I recommend the establishment of a Board of Industries which should be only advisory in character. The Member of the Governor's Executive Council in charge of the Industries portfolio, should be the President of this Board. The Director of Industries should be a member. The Madras Chamber of Commerce, the South Indian Chamber of Commerce and the Trades Association should each elect a competent member with extensive knowledge of industries and capable of advising the Government in industrial matters, to represent them on the Board. Besides these, Government should nominate two Indian members from the Presidency who are likely to usefully fill their place on the Board and who are able to materially advance the development of industries. From time to time, it will be necessary to have specialists to advise the Board, as the nature of enquiries demand. Such specialists who give their services free, should be temporary members of the Board.

In addition to the Advisory Board, the present post of the Director of Industries should be retained. The designation—Director of Industries—is a misnomer and a less high sounding title should be used. The best available man who will be able to give impetus to the development of industries should be appointed as the head of the Department of Industries. The fittest man should be selected, it does not matter whether he is a Civilian or a businessman or an expert. He must possess exceptional organising ability which is absolutely essential. He must be well-informed in industrial matters and needs of the country. Practical knowledge of industries is certainly a great recommendation. But as it is not possible for a single man to possess all round knowledge of several industries, this ideal cannot be fulfilled. The appointment of a business man with knowledge of industries has much to recommend. Such appointment is being justified by the present Director of the Department of Industries (this should be the proper designation instead of Director of Industries), United Provinces, who is showing remarkable energy in establishing new industries. However as I have said, Government must appoint the fittest man available and the selected officer must justify his appointment to be made permanent.

The Board of Industries will advise the Government as to the prospects of industries which can be started by Government for the benefit of the country. It will rest with this body to recommend the grant of aid to deserving industries, after impartial examination of the merits of each case. The Director of the Department of Industries should carry on the development of industries started under Government auspices. He will control the pioneer and the demonstration factories. He should not be under the control of the Board.

In order to correlate the separate activities of the various provinces as regards industries, it will be necessary to form an Imperial Department of Industries. It is possible to form such a department under a single head if the right man is discovered and if he is assisted by a group of experts with first hand knowledge of industries. Such an Imperial department will control the working of all the provincial departments more efficiently than the provincial Governments.

The Imperial department should investigate and inaugurate new industries wherever practicable, and prevent overlapping of the activities of the provincial departments. Its expert advice and decision will determine the development of industries throughout India.

Technical and scientific departments. Imperial departments.

According to the "Quinquennial Review of the Mineral Production of India" written by Sir Thomas Holland, while Director of the Geological Survey of India, "during the last hundred years the cost of a ton of sulphuric acid in England has been reduced from over £30 to under £2, and it is in consequence of the attendant revolution in the European chemical industries, aided by increased facilities for transport, that in India the manufacture of alum, copperas, blue vitriol, and the alkalies have been all but exterminated; that the export trade in nitre has been reduced instead of developed; that copper and several other metals are no longer smelted; that the country is robbed every year of over 90,000 tons of phosphatic fertilisers; and that it is compelled to pay over 20 millions sterling for products obtained in Europe from minerals identical with those lying idle in India".

A more glaring exposure of the imperative need for an Imperial Department of Industrial Research cannot be made. Although much attention has rightly been paid and heavy expenditure incurred for the development of agriculture, the time has come when the possibilities of applied chemistry and the development of manufacturing industries ought not to be ignored. In the whole of India, there are not more than half a dozen Professors of Geology and research in applied chemistry and geology is unknown so far as the universities are concerned. Under the circumstances, much cannot be expected from the existing universities, and hence the necessity for an Imperial Department of Industrial Research. One of the principal functions of the proposed Imperial Department, if constituted, should be to at once take up the problem of the development of industries for the utilisation of the mineral resources with the help of applied chemistry and chemical engineering, so that at least this 20 millions sterling which are annually lost are saved to the country.

As I have said, the details of the constitution of an Imperial Department of Industrial Research can only be worked out by a group of specialists after prolonged investigation so that the experience of the Indian Institute of Science may not be repeated.

The Director of the Imperial Department should generally exercise control over the work of the heads of each department which will be constituted to carry on researches in the different branches of science and technology. The Director should also be in a position to obtain expert assistance outside the departments under his control, to initiate researches in any new industries the establishment of which offers distinct prospects. He should be given executive control of the entire organisation with as wide powers as possible and he will be directly responsible only to the Minister of Industries.

Provincial departments.

Local Governments should engage their own experts only for those industries which can be developed in their province. Their technical and scientific departments should be organised according to the industrial needs of their respective provinces.

Technological institutions.

The most suitable way of developing technological research institutions appears to me to be—

(1) by locating such institutions in industrial centres where these will be readily accessible to the best intellects of a practical bent who are capable of carrying on or who have evinced capacity for technological research;

(2) by attracting professors of international reputation and acknowledged specialists to occupy the various chairs;

(3) by affording extensive facilities for carrying on and publication of researches; and

(4) by offering sufficient encouragement in the shape of studentships and travelling scholarships.

Study of foreign methods.

Government technical and scientific experts who are permanently employed by Government under contract and who are not highly remunerated, should be encouraged to study conditions and methods in other countries, by grant of free passages and part of their expenses. But special experts engaged for establishing an industry who are supposed to possess uptodate knowledge of their respective industries or science should be debarred from such assistance.

Reference libraries.

I am not aware of the existence of any special reference libraries outside those maintained by the Government Scientific Departments. The difficulties in consulting works of reference in my case are very great. Such works are rarely accessible to me. I have been obliged to form a miniature library at considerable expense. But I am precluded from consulting highly important and consequently, high priced, and out of print publications.

My suggestion is that Government should establish free libraries of technical and scientific works at all the most important industrial centres.

Geological Survey publications.

The publications of the Geological Survey bearing on economic geology have given invaluable aid to the mining industry. The issue of records and memoirs dealing with economic minerals is eagerly awaited and read with great interest by those who have identified themselves with the development of the mineral industry in India. New industries have been successfully established and already existing industries have received impetus from the publication of the researches conducted by the members of the Geological Survey. In a number of cases, the results have been of far-reaching importance. Dr. Ball's Economic Geology of India has laid the foundation of a number of industries. The coal resources of India would have remained unknown but for the publication of the researches by eminent specialists of the Survey. The present magnitude of the coal mining industry is due in a great measure to the pioneers who investigated and accurately mapped all the coalfields of India. The value of the publications embodying these investigations is clearly shown by the fact that these memoirs have long been out of print and old copies cannot be purchased at any cost. The exploitation of petroleum by modern methods has followed the publication of the chemical and geological researches carried on by the Survey. The publication of the memoir on the mica deposits of India made the mica resources of India known in Europe and America and led to the development of the industry to a marked extent. The published results of the investigations of the Geological Survey showed the futility of carrying on the gold mining industry in Chotanagpur and Wynaad. This led to the abandonment of these supposed rich goldfields. Otherwise, the exploitation of these areas would have been continued with great loss of money and credit of India as an important mineral field. The existence of bauxite deposits was unknown in India previous to the discovery of the identity of this mineral with aluminous laterites of India by Sir Thomas Holland. Endeavours are now being made to manufacture aluminium from the Indian laterite. I am inclined to think that the bauxite discoveries in British Guiana which are now considered of national importance are the direct result of the publication of the results of Sir Thomas Holland's researches The occurrence of laterite in British Guiana was known long ago. But it is only after the establishment of the identity of the aluminous Indian laterite that attention was directed to the possibilities of the laterite deposits of Guiana. The publication of the discovery of iron-ore deposits of the Gurumaishini hills by Mr. P. N. Bose of the Survey has led to the important developments which have now placed the Tata Iron and Steel Works in an enviable position. The criticisms of Sir Thomas Holland and of Dr. Fermor on the wasteful methods of mining manganese, published by the Geological Survey, have had to a decided improvement in the working of these valuable deposits. Dr. Fermor's memoir on the manganese-ore deposits of India, which is a monument of research and industry, is invaluable to those who are engaged in studying and working manganese-ore deposits. The development of the corundum, chromite, tungsten, magnesite, copper, manganese, iron and many other mining industries can be traced to the publications of the Geological survey.

Partnerships.

It is highly desirable in the interests of trade to introduce a compulsory system of registration or disclosure of partnerships. But such a measure is almost impracticable of enforcement.

Roads, Railways, waterways.

Lack of transport facilities in this province materially hinders the development of important mineral industries. The development of the iron and steel manufacture in the Madras Presidency is hindered mainly by lack of transport facilities. A number of mineral industries can be started but for the present high freight rates charged by the railway companies. Shipment of iron-ore to Europe is impossible on account of the present high railway freights which are quite out of proportion to the value of the ore. An extensive development of the iron-ore trade can take place if low rates are obtainable. Considering the rate for coal, the freight for iron-ore ought to be less than one-tenth of a pie per maund per mile. While the principal manganese carrying railways charge freight for manganese at one-tenth of a pie per maund per mile, the Southern Mahratta Railway Company arbitrarily fix the freight at a rate which is far in excess of the one-tenth of a pie rate. This high freight has retarded the development of the South Indian manganese industry to a marked extent. The South Indian ore is almost invariably second or third grade and is not of such good quality as the ore of the Central Provinces or Bengal. A substantial reduction of the railway freight will result in heavier export of ore from the manganese mines in Southern India. On account of the war, abnormal sea freight and high railway freight, these mines have ceased to work.

The following minerals can be worked and exported on a large scale from Southern India, if the railway freights are substantially reduced:—

(1) chromite,
(2) barytes,
(3) steatite,
(4) magnesite,
(5) ochre,
(6) phosphates.

The following railway extensions will lead to the development of the undermentioned mineral industries provided substantial reductions are made in freight rates:—

(1) Railway extension from Kanevihalli to Kammataruvu will tap the largest iron and manganese ore-deposits in Southern India;
(2) Railway extension from Trichinopoly to Utatur will tap the only extensive deposits of phosphates known in India;
(3) Railway extension from Betamcherla to Pendekallu to tap the extensive steatite deposits;
(4) Railway extension from Kondapuram to Nari Jampalli to tap large deposits of barytes;
(5) Railway extension from Woblapuram to the foot of the Copper Mountain range.

Shipping freights.

The export of ores and minerals from India is severely handicapped by the high shipping freights. Although there are vast reserves of high grade iron-ore, no shipment to Europe is possible on account of the high freight for this ore. Under normal conditions, on account of comparatively high sea freight, Indian manganese-ore is placed at a great disadvantage to compete with the Caucasian and Brazilian ores, as the latter are not burdened with heavy ocean freight. A number of minerals can be shipped to Europe from India. But the development of an external trade in these minerals is rendered impossible by the prohibitive railway and ocean freights.

The only remedy is for the Government either to control freights or to purchase a number of steamers for the development of such external trade of magnitude as the export of iron-ore. A number of private firms find it cheaper to buy ships than to hire them. For example, it was reported sometime ago that the Bethlehem Steel Corporation of Pittsburg was going to build a fleet of steamers for the transport of iron-ore from the Chillian mines. A great impetus can be given to certain industries in India, if State-owned steamers are provided to reduce freight.

Mining and Prospecting rules.

The abolishing of exploring licenses has been prejudicial to the interest of the development of the mineral industry. No exploring work can now be carried on within forest reserves. I suggest the reinstitution of exploring licenses, as these had facilitated the exploration of wide areas in the past, leading to the discovery of mineral deposits.

There is always much delay in the grant of prospecting licenses and mining leases. For example, an application for a prospecting license sent on the 7th March 1916, was granted only on the 29th July. This involved only an area of 33.5 acres situated in a reserved forest. Mining leases take as much as a year to grant. Before granting prospecting licenses, the Collector makes enquiries about any objection against the area applied for, through the District Forest Officer or the Tahsildar. These officers pass on the enquiry to their subordinates who are never prompt in their investigation and much unnecessary delay occurs and opportunity for starting work and even for fulfilling orders for minerals is lost. As all the officers and their subordinates concerned have other duties to perform, much valuable time is lost in obtaining licenses even after the fulfilment of all the conditions. Such delays are unknown in Mysore where licenses and leases are granted by the Director of the Department of Mines and Geology.

Instead of a sketch, applicants are now required to submit a plan or map with their application. If an application is sent without a map, it is not accepted by some Collectors. A map or plan for an area required within a forest reserve, cannot be prepared as even entry within a reserve is objected to, at times. If the Collector is requested to prepare the plan according to rule 17, there is much delay and sometimes heavy charges for the preparation of plans. In areas not declared as specified by the Local Government, the erection of cairns with distinguishing mark, has been insisted upon. The grant of unreserved lands immediately adjoining forest lands, has been refused under a single license and separate applications for each type of land even if adjoining each other, is required. This leads to unnecessary multiplicity of security deposits which bear no interest.

Rule 31 enjoining a licensee to give 30 days' notice to the District Forest Officer, ought to be deleted, as this entails much unnecessary delay in starting prospecting work. Whatever conditions have to be imposed, should be settled during the long period of preliminary enquiry before the grant of the license.

I have no fault to find against the present Mining and Prospecting Rules. They are as good as can be expected under the existing circumstances. But the license and lease deeds contain additional conditions beyond those laid down in the rules and some of these entail hardships on the licensees and lessees. Nearly all the Collectors I have come in touch with, administer the rules sympathetically. But there are isolated instances where the attitude of the head of a district has been quite different.

In the Madras Presidency, there are minerals which are necessary for industries of Imperial importance. The immense iron-ore reserves of the Bellary district ought to be developed at public expense. I also recommend the development of the copper-ore deposits of Chotanagpur, especially those of the Kharsawan State, for the establishment of the manufacture of copper, sulphuric acid and sulphur, which are all essential. In my opinion, the galena mines of the Cuddapah district ought to be further examined and if proved to still contain large reserves of lead-ore, these should be worked at public expense. All the minerals mentioned above are of direct importance for the manufacture of munitions of war. Sulphur is being imported from Sicily and Japan. Among other minerals of national importance, may be mentioned bauxite, chromite, tin, tungsten, zinc and manganese ores which are already being worked by private agencies in India. I think there is scope for the manufacture of ferro-manganese in India, as a national industry. No important source of nickel, cobalt and molybdenite has yet been found in India. If extensive deposits of these minerals with the possible exception of cobalt are found, they may be worked at public expense, as these minerals are of paramount importance for the manufacture of munitions. In my opinion, deposits of the so-called rare earths, specially uranium, thorium and vanadium bearing minerals, if found of sufficient importance, ought to be developed at public expense. The saltpetre industry may perhaps be nationalised with advantage. At present, diamonds are being imported into India, which are all of South African origin, although India can supply all the requirements of this country with far superior stones. But such an article of mere luxury ought not to be developed at public expense.

Forest policy.

From the point of view of mine owners, I do not think I shall be far wrong if I say that the present policy of the Forest Department is antagonistic to the development of the mining industry. Although I know from personal experience that several officers not only welcome the opening of mines within their jurisdiction but also afford facilities for carrying on the work, there are exceptions. An application for a prospecting license for manganese was refused because the area was situated within a reserve, although the trees within that area could only be seen through a microscope. A similar application for prospecting the famous Baswapur galena mine of Newbold was objected to by a Conservator of Forests, although the Collector was in favour of granting the license. The special conditions for prospecting in Forest reserves appear to me to be unnecessary. In Mysore, there are no restrictions against prospecting work in the reserves, beyond a system of levying compensation for cutting trees. The Mysore rates are very high compared with those prevailing in British India. But I have known no interference from the Mysore Forest Officials or their subordinates.

To remove the present difficulties which attend mining enterprise in the Forest reserve, it is only necessary for Government to advise the Forest officers concerned to facilitate the development of the mining industry. If this be not effective areas granted for mining or prospecting within reserves ought to be disafforested and placed within the direct jurisdiction of Collectors.

I have been actively concerned in the following industries in the Madras Presidency:—

(1) Steatite mining near Betamcherla, Kurnool district.
(2) Diamond mining near Betamcherla, Kurnool district.
(3) Galena mining at Koilkonda, Kurnool district.
(4) Manganese mining in the Sandur State.
(5) Development of the phosphate deposits in the Trichinopoly district.
(6) Development of the iron-mining industry in the Bellary district.
(7) Barytes mining in the Ceded districts.

Most of the above industries have been pioneered by me.

(*Witness here gave confidential evidence.*)

Suggestions for industries.

I have no doubt that it is high time to start the manufacture of iron and steel in Southern India. The pioneer iron manufacturing concern in India was started in the Madras Presidency by Heath so long ago as 1830. According to Mahon, its failure was due to inexperience, defective machinery and want of capital. Much fruitless investigations have centred on the Salem magnetite deposits. But the most valuable deposits of iron-ore have been entirely neglected and these lie unnoticed and untouched. I refer to the iron-ore deposits discovered by me on the Sandur hills and in the Copper Mountain which are certainly the most extensive in India, so far as I can judge from the published reports on the other deposits elsewhere. In the course of my explorations I found that for the entire length of the plateaus crowning the western hill range from Ramandrug to Kammatharuvu for a distance of nearly 20 miles, we have a continued succession of deposits of iron-ore with very few large breaks. It is true that the bulk of these deposits contains ore of inferior grade (between 40 and 56 per cent). But on the southern plateaus of Subrayanhalli, Kumaraswami, Mannai Haruvu and Kammatharuvu, there are deposits of high grade haematite which are of enormous extent. One walks on nothing but rich haematite and manganese-ore beds. These statements may appear as mere exaggeration. But I have no doubt that my assertions will be supported by any competent geologist who will take the trouble of examining the area. From actual measurements, I estimate the quantity of available high grade haematite from a single deposit at not less than 40 million tons. An average sample taken along one of the outcrops (Muli Harivi Gutti) which is a solid hill of haematite, gave Fe. 66.08, Si. 02.65 and P. .012.

The essential features of Sandur red haematite may be briefly stated to consist in its singular richness in iron and its low percentage of silica and phosphorus and almost entire absence of injurious elements. These reserves of haematite ought to be developed either by Government as a national industry of Imperial importance or by private agencies, preferably by Messrs. Tata Sons & Co., whose experience places them in a pre-eminent position to undertake this work.

Abundant supplies of limestone are available from the extensive beds near Betamcherla and other places in the Kurnool and Cuddapah districts. Dolomite can be obtained in any quantity from near Castle Rock. Inexhaustible supplies of siliceous iron-ore are available from the rich haematite quartzite beds in the Sandur hills. The sources of limestone and dolomite mentioned above can be utilised, in case iron-smelting works are erected near Hospet where plenty of water is available from the Tungabhadra. The position of Hospet is central for Bombay, Madras, Mormugao and Masulipatam.

All the above raw materials can be assembled at low cost. Sufficient supply of labour will be available. The opening of a great settlement for criminal tribes such as Woddas (who are miners by caste), Lambadies and Boyas who are all exceptionally hardy workers, ought to solve the labour problem in connection with the working of the mines.

The entire absence of coal and high freight charges bar the development of an important iron industry in Southern India. The only solution of these difficulties lies in the substantial reduction of freight (which will be compensated by an enormous traffic) or the purchase of a fleet of steamers or both. These difficulties have been surmounted in other parts of the world and ought not to stand in the way of the development of an industry of national importance which will go far to promote the progress of India.

ORAL EVIDENCE, 22ND JANUARY 1917.

President.—*Q.* Your main remark is that the Geological Survey as at present constituted is insufficient for the number of problems that you wish to be taken up in India?—*A.* Yes.

Q. Is that really what you want us to consider?—*A.* Yes.

We have had that put before us also and evidence is accumulating to show that the Geological Survey appears to be insufficiently manned for many of the problems immediately before us in India.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* You say about Government assistance, "such aid should be given only to pioneers of important industries and to small capitalists and not to those who can command capital." Do we understand this to mean guaranteed Government purchase of products also?—*A.* No. I don't apply it to that.

Q. You say "Government should grant financial assistance only on the merits of each case irrespective of the financial standing of the promoters provided they are honest and their project is sound"?—*A.* If the proposition is meritorious. I have subsequently said that when Government give financial assistance on a large scale, a Government Director should be appointed.

Q. Government has to finance the concern and conduct the concern, then what assistance does this man get?—*A.* Government can appoint a Director to see only that the money given by Government is not wasted.

Q. If a man brings a scheme he gets nothing?—*A.* He will get the profits of the industry.

Q. If Government gives money it should conduct the industries?—*A.* I don't say that Government will conduct the industry but I say that Government will exercise some check on the industry so that the money is not wasted.

Q. And should Government give money to these people?—*A.* Yes, if the proposition is meritorious.

Q. Even when they are not bringing any capital?—*A.* But small financiers cannot supply large capital.

Q. Supposing a man brings a scheme but has no money, and if Government finance the concern and if it is managed under their control, should the benefits go to the man?—*A.* Yes, but Government may get interest.

Q. But if Government finance the concern why should they not carry on the industry themselves?—*A.* So far as the present conditions are concerned, Government are not carrying on many industries.

Q. But they should and they ought to?—*A.* In certain cases as I have pointed out, the manufacture of steel in Southern India for example.

Q. You say that if the Indian Institute of Science had been located in Bengal it would have attracted a larger number of brilliant students?—*A.* That is my personal opinion.

Q. There is need for an institution in Bengal and another in the Madras Presidency, so Bangalore could do the work for the Madras Presidency and in Bengal there ought to be another one?—*A.* Yes.

Q. You say that the inamdars and the pattadars often demand most exorbitant terms for the mining of minerals in their lands. Do the lands belong to them?—*A.* Yes. I don't mean that the inam lands should be brought under the control of Government, but patta lands ought to be brought under the control of Government.

Q. Here you mention the inamdars too?—*A.* (No answer.)

Q. You say "As for the children of the labourers, although I recognise the value of compulsory education, I think it will produce only a discontented class of men averse to manual labour." On what grounds do you base this argument?—*A.* Because I found that in some cases which have come to my knowledge, villagers who have been a little educated aspire to high posts.

Q. If they had a little primary education?—*A.* Yes.

Q. And they would not work and you are of opinion that if primary education is given to these labourers or to their children they will not work in the factory?—*A.* They will demand higher wages and better posts. They won't work as labourers if they are educated.

Q. Don't you think that if a man knows to read and write and has a little manual training he will be a better workman and will be able to produce better articles?—*A.* Yes. But we won't get a cooly class.

Q. You want to keep them without education so that they should work?—*A.* (No answer.)

Q. You mention that the fittest man should be selected as the Director of Industries and it does not matter whether he is a civilian or a business man or an expert. What do you think ought to be the salary of the Director of Industries?—*A.* That is difficult for me to fix.

Q. On what salary do you think you can get a man with all these qualifications?—*A.* I don't think on less than Rs. 3,000.

Q. Then you say that the Director of Industries should not be under the control of the Board?—*A.* Yes.

Q. Then the Board should work under him or should work under the Government?—A. Certainly, I don't say that the Board should work under the Director of Industries, but I say that the Board should work under the Government.

Q. What do you think as to the prospect of iron-ore in this part of the country? Do you think that it is better that it should be exported?—*A.* Not only exported but it should be worked locally also.

Q. Turned into steel?—*A.* Yes. Iron and steel.

Q. But there is no coal?—*A.* That is quite true and I have considered that question very well. When I find that iron-ores from Chile have been sent even to Europe and there is a regular export from Chile to Pittsburgh, I don't see why the South Indian iron-ore should not be sent to Bengal and smelted there.

Q. Do you think it will be able to compete with the steel concerns and iron concerns in the north of India?—*A.* It is simply a question of freight.

Q. But do you think that freight should be reduced to such a level that you should be able to compete with northern concerns?—*A.* I don't wish to say that freight should be reduced to such an extent.

Q. By what percentage ought freight to be reduced?—*A.* I have not calculated that yet, but I can say about export which I have calculated.

Q. You speak about diamond mines in this country. Have you in your mind any big diamond mine in this country?—*A.* Yes.

Hon'ble M. M. Malaviya.—*Q.* You say that owing to the want of banking facilities in India the control of some of the most important mining concerns has passed into foreign hands?—*A.* I think I have asked that to be treated as confidential. But I have no objection to reply to your questions on that subject because it is to the interest of India that the control of important mines by foreigners should be prevented.

Q. Is it a fact within your knowledge that owing to the want of banking facilities the control of some of the most important mining concerns has passed into foreign hands?—*A.* Yes.

Q. Do you know of any endeavour by any company or any individuals to work any of these mines who failed to obtain banking facilities?—*A.* I know of one case in which it was impossible to get a concern financed in India because it required a very large capital.

Q. Was the proposal put before the public?—*A.* No. The promoters did not want to put it before the public because they knew that they would not get the capital in this country.

Q. But they might have been wrong in their view, was it as a matter of fact put before the public?—*A.* No.

Q. You think that if there were a bank which would finance mining concerns under proper conditions more mines will be worked than are at present?—*A.* Yes.

Q. By Indians?—*A.* Yes.

Q. You say "a number of mineral industries can be started with success in India provided these industries receive grants of bounties or subsidies or are protected from foreign competition." Even without grants of bounties or subsidies being given do you think that these mineral industries can be worked with success if there are banking facilities provided?—*A.* Some of them will be worked with success but not others.

Q. Unless they are protected against foreign competition?—*A.* Yes.

Q. Can you name one or two?—*A.* For example—barytes, that needs protection. Similarly, diamond mining industry and steatite industry.

Q. All these industries would thrive if they were protected from competition?—*A.* Yes.

President.—*Q.* What does diamond mining want in the way of protection?—*A.* Now all the diamonds are coming from South Africa and if Government prohibit the import of diamonds of South African origin, I think the Indian mines can be worked very profitably.

Hon'ble Pandit M. M. Malaviya.—*Q.* You don't think that Indian mines can compete with South African mines without protection?—*A.* Without protection I have some doubts.

Q. But you think that the diamond industry should be protected from foreign competition in order to prevent money going out of the country while there is diamond available in the mines in the country?—*A.* Yes and that will give employment to a very large number of men.

President.—*Q.* What is the import duty on diamonds?—*A.* I cannot give that offhand.

Q. Have you considered the effect of such protection on the jewellery trade here?—*A.* I have not thoroughly gone into that question.

Q. But you don't think that the importance of encouraging the indigenous mine industry should predominate over considerations of injury to existing trade or you also provide for that?—*A.* So far as jewels set with diamonds are concerned, I don't see why there should be any special loss to the country in any way. So far as I know, diamonds are not cut in India except only by a limited number of men; but rubies are extensively cut.

Hon'ble Pandit M. M. Malaviya.—*Q.* You say that Government should undertake the pioneering of metallurgical and chemical industries similar to those inaugurated by the Canadian Government?—*A.* Yes.

Q. What information have you about Government encouraging these industries in Canada?—*A.* I know the Canadian Government have spent any amount of money in starting experimental stations for electric smelting and they have been experimenting with peat on a large scale and all these have led to the establishment of large industries by private persons.

Q. Have they done so in the case of several industries?—*A.* Yes.

Q. And when the industry has been proved to be a commercial success what is the method which they adopt in handing it on to private enterprise?—*A.* I have read some particulars about it, but I do not know about the details.

Q. You suggest the creation of new banking agencies to give material assistance to mining undertakings?—*A.* Yes.

Q. In the shape of an industrial bank, not the ordinary type of bank but an industrial bank, which should lend money on the security of stocks, saleables, machinery, etc.?—*A.* Yes.

Q. You say that the Indian Institute of Science has not yet achieved the objects of its illustrious founder and that it has failed to attract and turn out research workers in sufficient numbers. Can you tell us the reasons which in your opinion have led to that failure? Why has it failed to attract workers?—*A.* I have given it later on, that it has been established at a wrong centre.

Q. Is that the principal reason or have you any other reason to advance?—*A.* And also the professorial staff. If eminent professors had been appointed. I think more students would have been attracted.

Q. You think that the selection of professors has not always been happy?—*A.* Yes.

President.—*Q.* You mean that they have not been eminent enough?—*A.* Yes.

Hon'ble Pandit M. M. Malaviya.—*Q.* Are you familiar with the working of this institution?—*A.* No.

Q. Do you think that if the institution were in the hands of Government or under Government control it would have produced better results?—*A.* That I am not prepared to say.

Q. About the *locale* of the Indian Institute of Science, you know that Indian students go out to America, Japan, Germany and England to acquire scientific and technical knowledge?—*A.* Yes.

Q. Then if the institute were really attractive by reason of its staff being eminent and its instruction being practical and highly useful, don't you think that Indian students would be attracted to it in spite of its distance?—*A.* Students go to Europe, America and other places attracted by eminent professors.

Q. And that is what I say?—*A.* And there are other inducements and Bangalore is neither Europe nor America.

Q. It is not the fact of its being Bangalore that is the real difficulty, but the fact that it is not having sufficiently eminent professors to attract students?—*A.* Both.

Q. Have you been to Bangalore?—*A.* Yes.

Q. What is your objection to Bangalore? Why do you say that the Institute has failed partly because of its being at Bangalore?—*A.* In my opinion, most of the research scholars who are now in Bengal do not want to go to the Institute of Science at Bangalore because it is too far from their home.

Q. Do you know of the Victoria Technical Institute at Bombay?—*A.* I have heard of it.

Q. Do you know that students are attracted to it from all parts of India?—*A.* Most likely the teaching there is very efficient, and there may be other attractions, such as certificates granted by that Institute being acceptable to mill managers.

Q. Does it not come to this then that if the teaching were made more efficient, more students would be attracted?—*A.* Yes.

Q. You complain, and rightly, of the absence of provision for industrial research in this country and you draw attention to the fact that there is not a single chair of applied chemistry in any university in India. You think that the time has come when there should be chairs of applied chemistry in every university in India?—*A.* Yes.

Q. And also for teaching metallurgy and electro-technics and mechanical engineering?—*A.* Yes.

Q. You think that if the Imperial Institute that you suggest is constituted the universities and the institute working together will afford sufficient facilities for the training of young men who may want to qualify for business pursuits?—*A.* That will all depend on the professors.

Q. Of course it will, but you think that such a centre should be provided?—*A.* Yes.

Q. You say you recognise the value of compulsory primary education for the children of labourers, but you think it will produce a discontented class of men averse to manual labour. Have you any practical experience of the results of education provided for the children of labourers or is it a mere opinion based on surmise?—*A.* No, it is not merely based on surmise.

Q. Do you know that in Germany, America, Japan, England and in all civilised countries elementary education is compulsory now?—*A.* Yes.

Q. Do you know that the efficiency of labourers has been greatly improved in these countries by means of the elementary education that has been imparted?—*A.* May be.

Q. You don't know that it has been?—*A.* I have read a good deal about it, but I am not quite sure that it is only due to education.

Q. It is not claimed that is it due to education only but that it is due largely to education?—*A.* I think the social system is a great factor.

Q. But you have not read or heard it said that the education that has been imparted in these countries has made the labourer averse from manual labour?—A. But it has produced a dangerous discontented class.

Q. You have not heard it said that it has made them averse from manual labour in these countries?—A. No. But here I might give one example. My butler's son does not want to become a butler but he aspires to become a deputy collector.

Q. I am glad he does. Why should he not? How many men in high positions today are not the sons of very humble parents?—A. I know, but they are geniuses.

Q. Perhaps you are aware of one, the late Chief Justice of the Madras High Court Mr. Justice Muthuswami Ayyar, he was an orphan?—A. But he was a genius. He did not belong to the labouring class.

Q. Unless you give the child an opportunity, you cannot say what he has in him?—A. (No answer.)

Q. You say "The Imperial Department should investigate and inaugurate new industries wherever practicable and prevent overlapping of the activities of provincial departments. Its expert advice and decision will determine the development of industries throughout India.". Do you want the Imperial Department to decide matters of a business character, or do you want it to give expert advice on the propositions which may be put before it?—A. So far as industries are concerned mere expert scientific advice will not do. Expert scientific advice must go hand in hand with expert business advice.

Q. You want this department to be comprised not merely of experts who will advise on the technical aspects of a case, but also business men who will advise on the business aspects of the proposition which is submitted to them?—A. Yes.

Q. With reference to your quotation from Sir Thomas Holland's report in the Quinquennial Review of the Mineral Production of India which you have done so well in reproducing here, you say that these industries should be revived, namely, chemical industries, manufacture of alum, copperas blue vitriol and alkalis, and you say that in the existing circumstances much cannot be expected from the existing universities, by which I understand you to mean Universities as they are constituted at present?—A. Yes.

Q. If the staff is increased and contains men who can train young men to apply the teaching of science to industries, then the position will be altered?—A. Yes.

Q. Among the most suitable ways of developing technological research which you suggest, you mention also the offering of sufficient encouragement in the shape of studentships and travelling scholarships, and after providing a very good technological institution here, you would still encourage the best of your students to go out to other countries with studentships and travelling scholarships to complete their education there?—A. Yes.

Q. Do I understand you to be in favour of a larger number of scholarships being instituted than are given at present for this purpose?—A. Yes.

Q. And you would be in favour of selection being more carefully made than it has been hitherto in order to ensure that the students who go out should secure a better value in return for the money that is spent in helping them?—A. Yes.

Q. After dealing with the development of a number of minerals that are shipped to Europe from India, you speak of the difficulties of shipping freights and you suggest that the only remedy is for the Government either to control freights or to purchase a number of steamers for the development of such external trade of magnitude as the export of iron-ore. You have not suggested that this iron-ore should be manufactured in the country itself?—A. At the end of my statement, I have.

Q. You think then that it will be a preferable course to adopt to find out if we cannot manufacture iron-ore in this country before it is shipped to other countries?—A. Yes.

Q. You say that if Government supply the capital or assist in the formation of a company, diamond mining is a better proposition than many pioneer factories?—A. Yes.

Q. From that statement of yours, it is a matter which should be made public and pressed upon the attention of Government to see it worked out?—A. Yes.

Witness here gave confidential evidence.

WITNESS NO. 203.

MR. IAN SCOTT MACKENZIE, *General Manager, South India Industrials (Limited), Madras.*

WRITTEN EVIDENCE.

Capital.

I have had experience of raising capital for Electric Light, Power and Tramway Schemes in the Punjab, Central India and Eastern Bengal and Assam.

I have also had experience of a similar nature in the Madras Presidency in connection with sugar, rice, oil and cement enterprises.

In many cases I have found it difficult to raise capital from Indians and I attribute this to the fact that owing to lack of business knowledge and distrust of his fellow man, the Indian capitalist prefers to follow the practice of his forefathers of investing his money in land and house property rather than in industrial enterprise, which he regards as speculation of a risky order.

In cases when a concern has actually proved by its balance sheets that it offers a sound and lucrative return to shareholders, the Indian capitalist will invest his money in it, but he generally "fights shy" of any new or untried scheme, however sound it may actually be.

To remove the existing difficulties of raising capital I would advocate that Government should —

(1) Endeavour to make Indian capitalists realize that, in spite of its vast natural resources and possibilities, India is one of the most backward industrial countries in the world.

(2) Endeavour to make Indian capitalists understand that Government really means to render practical and financial assistance in the development of industries in India.

(3) Demonstrate and prove by actual results obtained in pioneer and demonstration factories that industrial enterprises, if well conceived, established and managed, do offer a good and safe investment.

In my experience as far as the Indian is concerned, capital is drawn from the pockets of landed proprietors and successful professional men—especially lawyers—that is to say from well-to-do people.

The Indian of moderate means, who can live within his income and save money, does not invest it in industrial enterprise and in many ways this is not to be wondered at.

Ever so many small syndicates, or private companies run by Indians, have been ruined solely because the proprietors spent more time in quarrelling with one another than in attending to their business and there have been so many examples of this that it is not surprising that in many cases capital has been difficult to collect.

If, however, people knew that Government were taking a paternal, practical and financial interest in the promotion of industries, I have little doubt that capital would be readily forthcoming.

Government assistance.

The question of the best method of giving Government financial aid to industrial enterprises is a difficult one to answer shortly, as it seems to me necessary that in each instance where there is a proposal of this nature, the case should be considered on its merits by the local Director and Board of Industries, who have special knowledge of the local conditions and the people whom it is proposed to aid.

As a general rule, however, I consider that —

(1) Guaranteed dividends for a limited period with or without subsequent refund to Government of the expenditure incurred in paying dividends at the guaranteed rate ;

(2) Supply of machinery and plant on the hire purchase system;

(3) Guaranteed Government purchase of products under special conditions and for limited periods ;

are the soundest methods to employ.

As to Government control, I consider that here again each case should be judged on its merits, but generally speaking the less "official" control the better.

If the local Director of Industries is a man who possesses the necessary knowledge, prestige and personality, he should be able to do all that is necessary unofficially to safeguard the interests of Government and at the same time produce successful commercial results in any pioneer or demonstration factory.

Too much control, in my opinion, would tend to either disgust the would-be industrialist or make him lose his self reliance.

At the same time I consider it essential that *if necessary* Government should have the power to absolutely control a factory which they are pioneering.

I think it is better that Government should guide rather than control a pioneer factory and I strongly advocate the policy of a sympathetic iron hand in a velvet glove !

I consider that the desirability of publishing the results obtained by Government experts, whether paid by Government or not, should in every case be considered by the local Director and Board of Industries in consultation with the firm or company to whom the Government expert has been lent.

As far as possible, however, I think that all results should be published.

Demonstration factories.

I could suggest a number of demonstration factories which might well be started in this province and would recommend, amongst many others, cotton seed and other oil pressing and high grade jaggery factories.

Surveys for industrial purposes.

I am not in a position to say whether the existing knowledge of the available resources of the country requires to be supplemented by further surveys, but I think this is highly probable.

At any rate I would advocate that the results and statistics which have been obtained up-to-date should be made more readily accessible than is the case at present.

During the last few years I have on many occasions found it difficult to obtain information of this nature by applying to various Government departments.

Commercial museums and sales agencies.

I think that commercial museums if they were established and administered by the Department of Industries would be most useful institutions and I would suggest that they should be inaugurated in every town of importance and that sales agencies should be established in conjunction with them so as to display the products of local industries generally and especially of minor and unorganized cottage industries.

I would further suggest that statistics which have been obtained as the result of local surveys of the resources of the country, agricultural, forest and mineral, should be available for inspection in such museums.

If this were done it would enable people to realize better than they are able to do at present what *is* being done in their province and what *could* be done!

If Government departments and large commercial concerns which use imported articles published lists of these articles and exhibited them in the commercial museums mentioned above, people would know what products are in demand and be able to act accordingly.

At the present moment I venture to think that the average man knows little or nothing of the nature or annual consumption of various commodities imported by Government departments and large commercial concerns.

Exhibitions.

I advocate that industrial exhibitions of a popular character should be held periodically in the large towns of each presidency so that buyers and sellers may be brought into contact with one another.

Trade representatives.

I consider that trade representatives to represent the whole of India in Great Britain, the Colonies, and foreign countries should be forthwith appointed and I think it would also be as well to see what can be done in the way of arranging for the Indian Government departments to purchase the products of industrial concerns which are already established and working in India.

Supply of raw materials.

I think it would be extremely difficult to lay down any hard and fast policy regarding the conditions which should govern the supply of raw materials by Government on favourable terms, but I could give examples of industries, which would undoubtedly be benefited if Government came to their aid in this manner.

Below I explain in detail a case in which Government might well come to the aid of a local industry in connection with the supply of lime shells and I will therefore say nothing more here

Land policy.

I recommend that whenever a new industry is started Government should by every means in its power assist in obtaining an absolutely clean title for land taken up by the industrialist.

At present to the best of my knowledge very little (if anything) is done in this line by Government.

Training of labour

In my experience very little has been done up to now to improve the efficiency and skill of Indian labourers and maistries as a class.

Some Indian workmen have learnt a good deal in certain mills and factories from the European foremen under whom they have worked, but as far as I know, no systematic attempt has been made in this presidency to improve the efficiency of the artisan class as a whole, save perhaps in the Buckingham and Carnatic Mills.

Industrial and other schools.

A trades school has recently been started in Madras in which lectures on practical mechanical engineering, fitting and plumbing, are being given.

As, however, these lectures are delivered in English by more or less untrained lecturers (i.e. men who have not been taught how to teach) I don't think much good will result.

Some while ago a committee was appointed by the Government of Madras to consider the question of starting trades and industrial schools in Madras and Sir Clement Simpson (of Binny & Co., Ltd.), and I, strongly urged that lectures should be delivered :—

(1) In the vernacular,
(2) By trained lecturers,
(3) At suitable centres and at suitable hours.

Our recommendations, however, seem to have been disregarded.

Of the 3,000 odd Indian workmen who are working under me at present I have no hesitation in saying that 98 per cent of the best men know practically no English and certainly would not profit by attending lectures delivered in English.

My suggestion is that trained teachers or lecturers, who can speak the local vernacular, should deliver lectures once a week or so in the evenings at the various large mills, works or factories in Madras and that their lectures should be made as practical as possible.

Men who have worked hard all day cannot be expected to walk miles to attend a lecture delivered in a foreign tongue by an unskilled lecturer.

They might (and probably would), be quite willing, however, to occasionally stay on an extra hour or so in the evening, in the factory in which they are employed, to hear a short lecture in their own language from a practical and skilled lecturer.

Apprenticeship system.

I have had considerable experience of training apprentices during the last ten years in Madras and the system which I have found most successful is to compel all apprentices to bind themselves to work for not less than two years.

During their apprenticeship they receive no pay, but when they are taken on, their parents or guardians have to deposit a sum of money in proportion to what they can reasonably afford and this money is refunded in monthly instalments if the apprentice works satisfactorily but not otherwise.

I consider that if suitably arranged industrial and trades lectures could be provided, on the lines I have already mentioned, all apprentices should be compelled to attend such lectures and sit for an examination every few months.

I feel strongly that industrial and trades schools should be under the control of the Departments of Industry, Imperial and Provincial, and not the Department of Education.

Training of supervising and technical staff.

Regarding the training of supervising and technical staff, as far as my experience goes, the Engineering College in Madras aims at turning out men more suitable for the Public Works Department than for commercial factories or mills.

I have found that men who have been trained in the Victoria Technical Institute, Bombay and who have also served an apprenticeship, make the most useful technical supervisors.

At whatever college men may be trained, however, I consider it absolutely essential that they should also serve an apprenticeship and be made to work really hard and at all hours which occasion may require.

Unless a man has "served his time" he usually has no idea what "working" really means!

I consider it of the utmost importance that the greatest possible care should be exercised in selecting the supervising and technical staff in Government pioneer and demonstration factories as the personal element counts for so much in getting things well and quickly done.

Specially selected men might, with advantage, be given grants by Government to go to Europe to study methods of manufacture, but not until they have proved their worth in India by showing that they really can *work!*

Official organization

In this province the Department of Industries is, as far as I know, the only organization which exists for the development of industries.

Government appear to have been reluctant to spend money as freely as they ought to have done and I actually know of industries pioneered by the Department of Industries which have not progressed satisfactorily almost entirely because insufficient funds were granted.

If industrial development is really to be encouraged, Government must make up its mind to spend and occasionally lose money and show confidence in its Directors of Industries.

If Government does not show confidence in its own men, how can the public be expected to do so?

I am of opinion that the best organization for the future development of industries in the Madras Presidency would be a Board composed as follows:—

(1) The Director of Industries,
(2) The Secretary and Treasurer of the Presidency Bank,
(3) The President of the Corporation of Madras,
(4) and (5) Two members nominated by the Madras Chamber of Commerce.

All except the Director of Industries would be honorary officials and the Board would be merely an Advisory Board, on whose advice the local Government would act and grant funds with as little delay as possible.

Whenever necessary new schemes or projects could be referred, for advice or expert opinion, to the Imperial Department of Industries, which I describe hereafter, but the important thing to aim at is to avoid the awful delay which exists at present in obtaining the necessary sanction and funds to start a new scheme.

Once a scheme has been approved of by the provincial Board of Industries it should be sanctioned by the provincial Government and started without any delay whatever.

In my opinion the importance of selecting suitable men to be Directors of Industries cannot possibly be overrated.

I consider that a Director's qualifications should be as follows:—

1. (1) He should have served an apprenticeship in a works mill or factory in Great Britain or on the Continent.
2. (2) He should have spent two or three years at a University and taken a degree or diploma in engineering or science.
3. (3) He should subsequently have had at least ten years' practical and commercial experience in an industrial company in India and actually shown what he can do.
4. (4) He should have a good knowledge of the province, the people, and the language or lanugages of the province in which he is to be Director of Industries
5. (5) He should be a man of marked personality and full of well balanced energy and enthusiasm.

It may be difficult at first to secure the services of men possessing all these varied qualifications, but if Government offer a suitable salary, I have little doubt that the right men will be forthcoming.

I strongly deprecate the appointment of non-expert officials to be Directors of Industries, as I know, from what people have actually told me, that such men would inspire little or no confidence amongst would-be Indian industrialists.

In order to correlate the separate activities of the various provinces, as regards the development of industries, I would most strongly advocate the formation of an Imperial department under a single head.

I express my views further on this subject under section below.

Technical and scientific departments.

Instead of endeavouring to answer in detail the numerous questions suggested under this heading, I will merely say that I feel very strongly indeed that every sort and kind of provincial organization, technical, commercial and educational, relating in any way whatsoever to the encouragement of industrial development, should be directed and guided by an Imperial department with which it should keep in close and intimate touch.

If such an Imperial department (consisting of the right men) with wide powers and ample funds were inaugurated, I feel confident that it would co-ordinate and prevent the existing unnecessary overlapping of, and friction between, provincial Departments of Industry, Government Technical, Scientific and Commercial Intelligence Departments, technological institutes, university colleges, colleges of commerce and trades or industrial schools, etc.

At the present moment, although there is a Director of Industries, the Madras Department of Industries is really controlled by one of the four members of the Madras Government Council, that is to say, by a man who has a hundred and one other things to attend to and who although doubtless an able man, has no special, technical or commercial qualifications or experience to guide him.

This state of affairs seems to me to be fundamentally wrong!

If Indian industries are to be successfully pioneered and developed by Government, I consider that it is above all else essential that men of suitable qualifications and experience should be chosen to control and administer industrial departments, whether Imperial or Provincial.

I also consider it absolutely necessary that such men should be allowed to work without undue interference from people who have no technical or commercial qualifications.

A provincial Government which is in close, intimate and sympathetic touch with the local Director and Board of Industries and also with the Imperial Department of Scientific Experts would, I am sure, produce good results in a comparatively short time.

There must, however, be complete co-operation and a determination to get things *done* without undue delay or haggling over a few rupees!

ndustrial and trade ournals.

I consider that such journals are excellent and can only suggest that they should be distributed more freely.

Monographs or bulletins on industrial development, such as those which are published in Mysore by the Director of Industries and Commerce, would, in my opinion, produce good results if they were more widely circulated.

I mention the Mysore bulletins because they are written in a very readable form and in such a way that they can be understood by people of ordinary intelligence, who do not possess any special technical knowledge.

ertificates of uality.

I have no experience of Government certificates of quality in this country, but it seems to me that there can be no doubt that such certificates would be of great value to any company or individual producing a really good product.

revention of dulteration.

A great deal of adulteration of locally manufactured and imported goods goes on in Madras at present and I strongly advocate the use of the penal law to stop such practices.

If Government appointed inspectors and analysts to work in conjunction with the local Department of Industries, I have very little doubt that good results would be obtained.

At present, so far as I know, practically nothing is done to prevent or even minimize adulteration.

Roads railways and waterways.

Owing amongst other things to the great shortage of wagons which exists at present and which, to the best of my belief, has always existed to some extent, railway companies in India are hindered from assisting industrial development as much as they might.

I would advocate that the Railway Board should be approached by the Indian Industrial Commission to see if some remedy cannot be found for the existing difficulties.

Excellent wagons can be made and are made in India and yet there is always a shortage.

Hydro-electric power surveys.

As far as I know a few surveys have been made in the Nilgiri hills and schemes have been drawn up, but nothing has actually yet been accomplished.

From my knowledge of the Madras Presidency, I am of opinion that there are great possibilities of developing hydro-electric power schemes, if the natural resources of the country were to be thoroughly investigated and reported on by experts.

Taking into account what has been done in this direction in Mysore and in Bombay, not to mention other schemes on a smaller scale in other parts of India, there ought to be no great difficulty in raising the necessary capital, if schemes are properly worked out and suitably put before the public.

A supply of electric energy at cheap rates would naturally have a beneficial effect upon industrial development especially in the Madras Presidency where coal is so expensive.

Forest department.

The only criticism I have to make is that it is difficult to obtain information quickly regarding timber for industrial purposes.

Some while ago, in connection with a pencil factory which my company were contemplating starting we had great difficulty in obtaining precise and definite information as to the quantity of timber which we could obtain and the rate which we would have to pay for it.

Jail competition.

I have no personal complaint to make regarding competition of Jail industries, but I know of many firms who complain bitterly about it.

My complaint is that Public Works Department Stores and Workshops compete with private Engineering Firms like the Beehive Foundry, Messrs. Massey & Co.'s Works and our own Reliance Foundry and Engineering Works.

I understand that the Indian Engineering Association are bringing this matter to the notice of the Commission and I will therefore say nothing further save that I think that competition of this kind is most undesirable.

General.

Regarding an industry in which I am actively concerned and engaged, viz., the manufacture of Portland Cement, I would suggest that Government should assist matters in connection with the supply of the most important raw material which is used namely, lime shells.

In Madras shells used for the manufacture of lime are excavated from certain areas which belong to Government.

These areas are periodically put up to auction with the result that one can never be sure what one will have to pay.

During the last ten years, very largely on account of the auction evil, the price of shells in Madras has practically doubled and although I have laid the whole case before Government very fully indeed, they have up to now actually done nothing to help us beyond promising to look into the matter and try to devise a scheme to put right what they see is a real grievance.

It seems to me that this is an obvious case in which Government should forthwith assist a local industry by supplying raw materials on reasonably favourable terms or at any rate at a fixed price for a long period of years.

My experience suggests to me a large number of new industries for which India seems peculiarly suited on account of its resources in raw materials, labour and market, but I would here mention only a few namely :—

(*a*) Wood distillation.
(*b*) The manufacture of alkalies.
(*c*) The manufacture of drugs.
(*d*) The manufacture of railway plant and rolling stock, textile and mill machinery and machine tools.

Although I understand that the fiscal question and the evil results of emigration are outside the scope of the Commission's enquiry, I venture to put on record that, in my opinion, it is almost impossible for these things to be overlooked if the industrial development of India is to make rapid progress.

Finally, I would like to say once more that in my opinion if Government really means to encourage industries, it must be prepared to spend money reasonably freely without expecting results too soon.

In plain language I would recommend that Government should either do the job thoroughly or leave it alone!

ORAL EVIDENCE, 22ND JANUARY 1917.

Mr. C. E. Low.—*Q.* With reference to what you say about financing agencies, to what extent do banks go into the accounts and general arrangements of the class of concern that they would be likely to finance at present?—*A.* I should say that the Bank of Madras—the only bank that I have experience of here—would be the only bank which deals with this sort of scheme and would go into the scheme very thoroughly.

Q. When you say "this sort of scheme" what do you mean; my question had reference to the ordinary sort of proposition that is put up at present by managing agent firms of repute?—*A.* In the case of big firms like Binny & Co. I don't think the bank would bother very much, as if a man like Sir Clement Simpson considered that a project was sound, there would not be much difficulty in the bank satisfying themselves that it was and they would finance as far as the Act allowed.

Q. Going a step further than that, supposing a proposition is put forward by a concern which is not backed by a house of some repute, so that they could take things for granted, but at the same time the scheme looks promising, and they decide to go into it, to what extent do they go into it, and by what means?—*A.* They do not finance bricks and mortar and machinery; they are precluded by the Bank Act: they can only finance stocks

Q. Will they provide working capital of that kind to a show that was going to start but had not actually started?—*A.* It depends of course: but they might in certain circumstances.

Q. What steps would they take, and what agency would they employ, to assure themselves that it was all right?—*A.* They would probably write to their local agent. The latter would go to the concern itself and see what the value of the land and building and machinery was and what sort of people they were. Then the bank would finance up to a 20 per cent margin. The borrower's godowns are locked up and the keys kept in charge of the bank's agent.

Q. That is to say, their investigation would be a business investigation, not a technical one?—*A.* Yes, business and accounts.

Q. Of course an accountant would go through their books?—*A.* Yes.

Q. No bank in this country, as far as you know, has any agency for making technical investigations?—*A.* Not as far as I know.

Q. Supposing we had, as you suggest, either industrial banks, or industrial sides to existing banks, and it was suggested to them that they should finance a proposition which had been approved by the Government Department of Industries—I mean a properly constituted Department of Industries—do you think that the banks would be prepared to rely on the opinion and report of the Government Department of Industries, or would they require some expert technical agency of their own?—*A.* They might possibly do so, but not necessarily if there were a well-constituted Department of Industries and a Board; they would possibly have more faith in the man they appoint themselves, but it would be rather difficult for that man to be an expert in everything.

Q. It would be practically impossible, unless they confined themselves to one or two industries?—*A.* I think so. If they were dealing through the local Department of Industries who were in touch with the Imperial department, they could, working together, get expert opinion on almost any subject, and having got that and having gone into the accounts, they would then be able to say whether they were justified in financing the concern or not.

Q. Supposing a concern was started on its own, without the *imprimatur* of the Department of Industries, and the bank had occasion to ask for the services of one of these experts, do you think that that perhaps might tend to give confidence in the Government agency by having experience of working with it on its own account?—*A.* I think so.

Q. With reference to the question of land policy; you recommend that whenever a new industry is started, Government should by every means in its power assist in obtaining an absolutely clean title for land taken up by the industrialist. Is that a serious difficulty in this presidency?—*A.* Oh yes, I know lots of cases; my own company for instance has been worried in all sorts of ways, because when some of its concerns were started, sufficient effort was not made to get an absolutely clean title from the beginning.

Mr. Ian Scott Mackenzie.

Q. Is that because of peculiar proprietary or tenancy rights, or from a defect in the law?—*A*. They vary so much in different parts of the Presidency. On the West Coast, land is held under a most extraordinary set of rules which do not obtain here. They vary in different parts of the presidency, and are very complicated and difficult to understand.

Q. This is a difficulty which is felt more or less acutely in different parts of India sometimes on account of the Government Tenancy Law and sometimes because of the way in which the law has been utilised by the public. Obviously it would be out of the question for any man who wanted to start an industry to come along and ask Government assistance in this respect, because you must have some preliminary investigation as to the man's bona fides, because otherwise it would be an opportunity for blackmail?—*A*. Assuming you got the *bona fides*, I don't see why the local officer, or whoever it may be, should not look into the question and help the man, once he established the fact that he was a *bona fide* would be industrialist.

Q. You could have the *bona fides* of the proposition investigated by the provincial Department of Industries?—*A*. Yes, and they would have to go to the land officials.

Q. I mean as regards the industry itself, they would investigate that first of all?—*A*. Yes.

Q. If they gave it a clean certificate, then you would say Government should go to fairly considerable lengths?—*A*. Yes, I do.

Q. Would you recommend an extension of the existing Land Acquisition Act?—*A* Yes, I would, if it is feasible.

Q. How do you think that would be regarded by the public; do you think it would be resented by any large class of people?—*A*. It is difficult to say.

Q. You speak of the training of apprentices; these apprentices work for you, say for not less than two years; what sort of employment could you then put them on to?—*A*. They can get on quite well; they rise to be foremen or supervisors. They might rise to anything. We have cases of men who have risen to be managers. When they first join they are put on to any odd job which entails hard work!

Q What does it amount to in pay?—*A*. A man who had done well during his two years would start from anything like 8 to 12 annas per day or more if he were worth it.

Q. What type of man is the apprentice when he comes to you; what has he had in the way of education?—*A*. Very little education practically, no education at all, some men make good fitters.

Q. These are men of the fitter type generally?—*A* Yes. In jute mills, we find jungly people do better. If a man's father has been a weaver or spinner, or whatever it may be, his son comes into the mill and works two years without pay. He would, however, be much better if he had received education.

Q. These men do actually rise in practice to pretty decent jobs?—*A*. Yes, quite decent jobs. I have one man within my knowledge in Madras who has risen from being a switch-board attendant to manager of a rice mill on Rs. 350 per month, but he was a very exceptional man, and you could not take him as a standard

Q. Was he a man who had worked as an overseer?—*A*. Yes, on electric tramways. He had been an inspector. We only get a few of these men, and I wish we could get more. Generally men educated in Bombay are well spoken of.

Q. You state the qualifications of the Director of Industries, and admit the difficulty of getting men of that type. You say "if Government offer a suitable salary, I have little doubt that the right men will be forthcoming." What would you consider you would get a man like that for?—*A*. Rs. 2,500 a month, rising to Rs. 3,500 a month, or something like that.

Q. I am not quite clear about what your idea is as to the relation of the provincial Government to the local Department of Industries and the Imperial Department of Industrial Experts. How does the provincial Government come in? In some things you want the provincial department to be in direct touch with the Imperial department?—*A*. I think that all three parties ought to be in touch. This is a rough idea. The Director gets a scheme in his head, and works it out fully after going into everything as far as he can. He then puts it before an Advisory Board which consists partly of Government officials, and partly of business men They go into it and say it is feasible, or it is not. Assuming they recommend it in a particular case, the Local Government may possibly have some little doubt in spite of the Board having recommended it, and they might want some further opinion or advice. They are at liberty to refer to the Imperial department, or they could direct the Director of Industries to do so. They should all work in close and intimate touch.

Q. Close contact sometimes creates a certain amount of friction; supposing—as it may very well be the case—the Imperial department had a very decided idea that a certain thing was a good proposition, and the Local Government did not like it;

which was going to carry the day?—*A*. You come back to the fundamental idea of who holds the purse strings; the Local Government have got to pay; you cannot eliminate them!

Q. No difficulty would arise unless the Imperial department were in a position to move the Government of India to press the Local Government about it?—*A*. Quite so.

Q. The point is, should the Local Government's opinion on a point of that sort, after having everybody's views before it, be more or less final; is it desirable to have free interference on the part of the Government of India in cases like this or not?—*A*. It is rather difficult to answer your question without having a specific case before me. I can imagine a case in which the opinion of the Local Government being final, might not be at all desirable.

Q. In things of Imperial importance, like the manufacture of aluminium?—*A*. Yes.

Q. But in a small show, do you think that the Local Government should hold the day?—*A*. Yes, I think so, generally speaking.

Q. That is to say things should be run pretty much on existing lines; you don't want any special departure from existing relations between the Imperial and Local Governments in this respect?—*A*. No, except that I think it as well that there should be as little non-expert interference as possible.

Mr. A. Chatterton.—*Q*. You state that you have had considerable experience of training apprentices in connection with the engineering works belonging to your firm?—*A*. Yes.

Q. Does that apply also to the other factories under the control of your firm?—*A*. It does.

Q. Have you apprentices in the jute mills?—*A*. Yes.

Q. Is it on the engineering side or the textile side?—*A*. The textile side.

Q. Have you got them in the rice mills too?—*A*. Yes, we have a few of them in each of the concerns.

Q. Including the pottery at Bangalore?—*A*. Not the pottery at Bangalore. We used to have them there, but the place is now run on contract.

Q. Were you a member of the Committee which was appointed to consider the question of industrial education?—*A*. I was.

Q. Did you approve of the scheme that was put up to the Madras Government?—*A*. No, Sir Clement Simpson and I put in a dissenting minute.

Q. I am referring to an earlier scheme than that; one for the establishment of apprentices in the engineering works in the northern part of Madras. The apprentices were to be given stipends by the Government, and the Government was to build a small technical school somewhere in the neighbourhood, so that these apprentices could get technical education. Were you on that Committee?—*A*. Yes.

Q. And you did not approve of it?—*A*. I did. I thought you meant the last Committee to which I make reference in my report.

Q. Do you think that this method of training artisans, etc., is preferable to the establishment of industrial schools at various places which are not worked under factory conditions?—*A*. I certainly think so. I think the more they work under practical factory conditions, the better.

Q. Have you had much to do with the Department of Industries in Madras, in connection with the development of industries here?—*A*. Yes, I have been in intimate touch with it for many years now.

Q. I understand you are associated with the Department of Industries in a scheme for making lime bricks, which is being carried out in your Cement Works?—*A*. Yes.

Q. Could you tell us under what conditions that scheme worked?—*A*. The arrangement is roughly this, that the plant was purchased by Government and erected at our Cement Works. We were to supply the raw materials consisting of sand and lime at cost price, and Government were to erect the plant and run it for a year, at the end of which time, if we came to the conclusion that the proposition was a commercial one, we were to have the first refusal of the plant; in other words, we were at liberty to take it over at the price Government had paid for it, but owing to the way in which the plant has been run, we have come to no conclusion whatever, and at the present moment it is shut down altogether.

Q. Shut down permanently or temporarily?—*A*. I believe temporarily. Government have sent a man to get hold of the details as to what ought to be done. They have sent the Assistant Director of Industries to Colombo to investigate. It might be taken as an example of how Government should *not* proceed to pioneer industries!

Dr. E. Hopkinson.—*Q*. You suggest that the presidency banks, such as the Bank of Madras, should have an industrial side supported by Government and worked in conjunction with the local Department of Industries. You have told us that the constitution of the Presidency Banks should be altered in order to permit of their financing

industrial concerns?—*A*. It would have to be. The present rules under which they work are such that they could not advance money for what I call bricks, mortar and machinery. They could only advance money to finance stocks.

***Q*. Is it your idea that the funds of the bank should be available for this purpose?—*A*. It is a Government bank; it is only a matter of opening a new department with a new side to it.**

Q. You propose to use the deposits for the purpose?—*A*. I do not mean public money; it would be purely Govenment money. That is more a question for Sir Bernard Hunter to answer. My proposal is that the banks, by whatever means they find convenient, should supply the funds to finance industries to a much wider extent than they do now, provided they are given a clean bill of health by the Department of Industries.

Q. Have you considered how that should be worked?—*A*. No, I have not.

Q. You have not compared this suggestion which you have made with the suggestion that there should be separate industrial banks?—*A*. My idea was, in suggesting Presidency Banks, that it was a sort of semi-Government bank, and without going into the details of the subject on which I am not an expert, I simply laid down roughly the idea I had for making finance available for sound concerns. I did not go into banking details nor am I competent to do so.

Hon'ble Sir R. N. Mookerjee.—*Q*. The Presidency Banks are not Government banks?—*A*. They are semi-Government banks.

Q. Government has no control over the management of the banks?—*A*. The Public Debt Office is at the bank.

Q. That has nothing to do with the banking?—*A*. I know that they are controlled by a Chairman and Board of Directors.

Dr. E. Hopkinson.—*Q*. Would they not object to your scheme?—*A*. I don't see why they should. We have started a co-operative scheme in the Tanjore district for people who mill paddy. They can obtain money on reasonable terms. I do not see why it should not go further.

Q. The reason why the Presidency Banks would object is that the security would be deficient?—*A*. Then Government would have to step in and risk something.

Q. Do you mean that Government should back the Presidency Banks?—*A*. In so far as this particular difficulty is concerned, yes.

Q. I think your proposal is more far-reaching?—*A*. It is simply an idea, the details of which I am not competent to work out.

Q. You suggest the need of a hydro-electric power survey for the whole of India?—*A*. Yes.

Q. Have you yourself, within your personal experience, found the need of such a survey; have you ever had occasion to look out for water power, and not known where to find it?—*A*. Yes.

Q. Such a survey would be a very expensive matter; do you think that the Government of India would be justified in attempting it?—*A*. I think they would, judging by the concerns which are already established and doing so well, such as the Cauvery scheme and the Bombay scheme. The Jhelum scheme is not doing so well in the Punjab, but that was badly thought out and put through in the beginning. I was not thinking so much of big places like Calcutta and Bombay. There are small places like Ootacamund where it might be possible to generate electric energy and convey it down to Coimbatore which is an industrial centre. It is a great blessing in Bangalore. They get their energy there under half a anna per unit. We pay at our Madras Cement Works 1.10 annas per unit.

Q. There is no doubt about the advantage of hydro-electric power, but what I want to get at is the advantage of a hydro-electric power survey; is it really in the interests of the country that a large sum should be spent in carrying that out, or should it be left to private enterprise?—*A*. I don't think so. I think we have seen enough of things being left to themselves, and it is time Government stepped in and stirred things up. People would then say there is power actually available in such and such a spot, and if we can start a factory near that spot, we would get our energy at so much per unit. I think it is most important.

Q. Do you know what has been done in countries like Norway and Sweden?—*Q*. I could not tell you but in Switzerland every little town has its hydro-electric scheme. I actually carried one out for the Government of Eastern Bengal and Assam at Shillong. We built some weirs, took the lowest rainfall, etc. We got a rough idea what power was available.

Q. How long did that survey take?—*A*. About five months, and I was doing other work as well.

Q. How many surveyors had you?—*A*. I had a party of 40 people, including coolies.

Hon'ble Sir R. N. Mookerjee.—*Q.* You say, "I would advocate that the Railway Board should be approached by the Indian Industrial Commission to see if some remedy cannot be found for the existing difficulties." It is not your idea that there should be a separate wagon company?—*A.* Yes, if it will supply wagons. If they have not got the money, there is an end of it, but if it is simply a question of making the wagons, the wagons can be made out here. The value of Government stores imported into India every year was so astonishing that I could hardly believe it, viz., Rs. 684 millions last year. Probably one-third of that consists of things that could be made out here. I recently saw the wagons that Burn & Co. are making.

Q. They were all made of imported material?—*A.* Yes, but Tata's people are going to roll plates before very long and they roll sections now.

Q. But up to now it is done with imported material?—*A.* Yes. I don't quite follow your question.

Q. Some of the witnesses suggested to us that there should be a wagon company?—*A.* Burn & Co., are for the time being a wagon company. They make wagons which the railway companies buy.

Q. What I mean is—suppose a certain company keep in stock, say 200 wagons ready at Howrah or Allahabad, and any people wanting wagons, would hire them?—*A.* I had not thought of any hiring scheme.

President.—*Q.* You have not met Sir R. N. Mookerjee's point. You said that "excellent wagons can be made and are made in India, and yet there is always a shortage." Put the sentence the other way, "excellent wagons can be made and are made in England, and yet there is a shortage." What difference does it make whether you put "in India" or "in England." Have you got a definite proposal to make with reference to the making of wagons in India?—*A.* The Railway Board should be approached to see if the Government have not got any money to spare to encourage wagon making in India.

Hon'ble Sir R. N. Mookerjee.—*Q.* That is a financial question; and has nothing to do with whether Burn & Co., or anyone else are making wagons?—*A.* True, but my object is to try to get more wagons, by some means or other and at the present moment especially every effort should, I think, be made to encourage wagon building in India.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* In regard to apprentices, you bind them for two years and do you pay them anything?—*A.* Nothing.

Q. Then after being apprenticed for two years what pay do you start them on?—*A.* It depends on the particular man; a man may get Re. 1 or As. 12 per day or more according to his worth.

Q. What are these apprentices; do they learn something or work like common workmen?—*A.* They work like common workmen, assisting in the shops.

Q. Do you think if you had an institution like the Victoria Technical Institute in this presidency you would get the students to go there?—*A.* It is rather difficult to say. Most people here like to be vakils and talkers rather than workers!

Q. Don't they get employment here?—*A.* Yes. They get employment. That is why we are so thankful when we get any of these men from Bombay or elsewhere. Two or three of the best men I have were Tanjore people who went to Bombay to be trained.

President.—*Q.* Do you think that if we had a similar institution run on similar lines in this presidency, it would be successful?—*A.* Yes.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Then about the Board of Industries, you say it should consist also of "Two members nominated by the Madras Chamber of Commerce." You mean one from the English Chamber and one from the Indian Chamber?—*A.* I was not thinking of the Indian Chamber, but I would have no objection to one from each Chamber.

Q. Then at the beginning of your note you say that ever so many private companies run by Indians have been ruined solely because the proprietors spent more time in quarrelling with one another than in attending to their business?—*A.* I have had examples of that within my own experience.

Q. They quarrel when their management is bad; or do they commence from the beginning?—*A.* I don't specify whether it is in the beginning.

Q. My point is this; I want to know whether they quarrel over the management of the concern, because every man who is engaged in the concern wants to manage it, or what?—*A.* Yes, they won't leave it to anyone or trust each other, hence the quarrels.

Sir F. H. Stewart.—*Q.* Are you a director of the Bank of Madras?—*A.* No.

Q. Does Government appoint any director to the Bank of Madras?—*A.* I could not tell you, but I think not.

Q. You say it is partly a Government bank?—*A.* I always so regarded it. I may be wrong, in view of what Dr. Hopkinson has said. It is generally regarded as a concern in which Government is very much interested.

Q. When the Bank of Madras advances money to finance stocks, it still wants two names?—*A.* Yes. Except in special cases.

Q. That limits the number of people who can get that assistance?—*A.* Yes.

Q. Would you propose to alter that, if you had an industrial side to the bank?—*A.* I think so. I deliberately did not say so because I am not an expert in banking. I think however the whole Bank Act might be modified and made more elastic.

Q. You say, "In my opinion, pioneer factories should be closed if, after expert technical and commercial investigation, it is shown conclusively that they cannot be successfully run on commercial lines, and they should be handed over to private capitalists or companies as soon as a new industry (*and not one particular factory*) has been well and firmly established." Do you mean that one particular factory would not necessarily prove the case?—*A.* I mean that there should be no hurry in handing over a pioneer factory, the idea being to establish industries. My theory is that one factory does not make an industry. Government should not be in a hurry to close up, hoping that other factories would start. New factories could benefit by the experience which was gained in the original factory, and especially by getting trained men.

Q. There would have to be a business side from the very beginning ; do you think it would be a good thing if Government went to business people and said "You do the business part of it and we shall supply the financial and expert aid" ; or do you think Government should do it all?—*A.* I think Government should do it all if they get the right men. The whole thing depends upon getting the right man for Director of Industries.

Q. With reference to your proposal regarding the Board of Industries you have qualified your answer to a certain extent by saying you would put in one member from the Indian Chamber of Commerce. Why do you suggest the President of the Corporation of Madras?—*A.* Because I think he would be a very useful man to have in the Board, especially in connection with property and leases. Such a man is almost invariably a picked man of good general experience.

Q. In regard to your qualifications for the Director ; don't you think that is a "Council of Perfection" ; will you have any chance of getting such a man?—*A.* You must have an ideal to strive after.

Q. Do you say that the pay should be Rs. 2,500?—*A.* You would not get a suitable man for less.

Q. Do you think it would answer at all to have a sort of service from which these men should be recruited, on the same lines as the Imperial Customs Service ; would that help to attract them?—*A.* It might! I would however sooner have men who had been through the practical side in commercial concerns.

Q. But they would be worth a lot of money by that time?—*A.* I dare say they would. If Government is not going to spend money freely, it is not worth while doing anything at all. I don't see how he would get as good a training as on the lines I have laid down.

Q. Have you got four Members of the Executive Council here?—*A.* Yes, the Governor and three Members. The Governor has a portfolio himself.

Q. About monographs and bulletins on industrial development, would it help to publish them in the vernacular in this presidency where there is a much wider knowledge of English?—*A.* I think so, because many of the industrial people cannot read or write anything except in their own language.

Q. Could any particular use be made of the vernacular press in that way ; would they print short articles?—*A.* I think so.

Q. That would distribute the information more widely?—*A.* Yes, I think that is quite sufficient, in addition to these bulletins.

Q. With reference to Government competition with private enterprise, have you got any specific instance that you would like to give us in confidence?—*A.* Yes. I will give one in confidence.

(*Witness subsequently sent a specific instance which is confidential.*)

Hon'ble Pandit M. M. Malaviya.—*Q.* You speak here of the difficulty of raising capital from Indians, and you attribute it to the lack of business knowledge and the distrust of their fellow men?—*A.* That is my opinion.

Q. Do you think that if a Bureau of Information were established, which supplied information to the public regarding the possibilities of commercial enterprises, that would improve matters?—*A.* I think that would be a help. I suggest something of the sort in my note.

Q. And you say that if people knew that Government were taking a paternal, practical and financial interest in the promotion of industries, you have little doubt that capital would be readily forthcoming. Is that the *crux* of the whole matter, so far as the Government is concerned?—*A.* My opinion is that capital would be found if the people saw that Government was really taking an interest.

Q. The particular form in which this could be done is a matter of detail, but the main point is that the people should see that the Government is taking a practical interest in promoting industries?—*A*. Quite so.

Q. You say about pioneer factories, that Government should make it clear that their policy is to promote industrial prosperity generally, and not the individual prosperity of any particular concern. How would you wish it to be done?—*A*. What I meant to convey was this, that Government should not purchase things from one of their own pioneer factories, unless the quality and the price of the article fully justified it. They should not show any favour thereby making it clear that they don't want to establish one model factory only but a new industry ; one factory to help—a parent factory for other factories to spring from.

Q. Should the Government pioneer factory be regarded as a rival to any concern?—*A*. I would avoid competition as far as possible, except in special cases. Healthy competition is sometimes good. If Government had all the latest machinery, they might be able to turn out things better than any other factory that was not keeping things up-to-date ; but as a general rule there should be an absence of competition.

Q. Except to keep up a high standard?—*A*. Yes.

Q. You suggest the creation of an industrial side to the Presidency Banks. If there is any difficulty felt in creating an industrial side to the Presidency Banks, would not your object be served if a separate institution was established?—*A*. I only suggested the Presidency Bank because I thought it was a semi-Government concern.

Q. The Government help it with a great deal of money without interest—70 lakhs and more and it is the bank in which Government makes its own deposits. But it may be that as it is constituted under the Act it cannot support industrial enterprises in the sense in which you want it to do ; but your object would be gained if a separate bank was started and supported by Government. If Government put some of its money into the new bank and guaranteed interest up to 4 or 5 per cent that would show to the public that Government was taking an interest in the bank. Do you think then that the public would subscribe to the funds of the bank?—*A*. Yes.

Q. Would you recommend the issuing of debentures?—*A*. Yes, I think that is a good idea.

Q. Would you have branches of this bank in the different districts of the provinces, in industrial centres ; or do you think one bank at the capital of the Presidency would be sufficient?—*A*. I have got an idea that branches would be good ; but this is a question that a banker could answer better than I could. I think branches would be desirable as far as I know.

Q. You say that the fee which the Government should charge for the services of their expert should be determined by its proportion to the financial position of the company or individual to whom the expert is lent?—*A*. I meant that more to refer to private individuals. Supposing a man has a good idea in his head, and he comes along to the Director of Industries and asks for his assistance or the loan of an expert and he shows that he is really a poor man. If a heavy fee were suggested, it might put him off.

Q. So your object is that the fee should be reasonably small in the case of small industries, but you do not advocate a heavy fee in the case of any industry?—*A*. No, I do not.

Q. You suggest demonstration factories for cotton seed and other oil pressing and high grade jaggery factories, but don't you think that if the Director of Industries interested himself in these, and published information showing how these could be made profitable, private capital would be forthcoming to take up these enterprises?—*A*. It might, but if he actually set up a factory to work, a really up-to-date jaggery making plant, for instance and if people could see how economically jaggery could be made with modern machinery, I feel confident that there would be a great future before it.

Q. And there would be no loss to the Government?—*A*. I don't see why there should be any loss.

Q. You suggest that whenever a new industry is started, Government should, by every means in its power, assist in obtaining an absolutely clean title for land taken up by the industrialist? It may not be within the power even of Government to guarantee that but are there not plots belonging to Government leases of which could be given for industrial purposes?—*A*. An extension of the Land Acquisition Act might be made, by which Government could, if necessary, step in and help the budding industrialist to get hold of land with a clean title.

Q. Remember that the interests of private owners have to receive full consideration, and that there may be legal difficulties which cannot be got over. Is there not sufficient land belonging to Government in Madras which could be leased to industrialists?—*A*. I am not in a position to give you an answer that is worth very much.

Q. You say that very little has been done in your experience to improve the efficiency and skill of Indian labourers. Why is it ; is it because the matter has not received attention or is there any difficulty in the way of taking steps to improve their efficiency?—*A*. I could not tell you why no steps have been taken. My experience is that Indian workmen are extremely good if they are handled properly.

Q. Have you found that lack of elementary education is an obstacle to their progress?—*A*. Yes, very greatly so.

Q. In your opinion, if they had received some elementary education, they would be more efficient workmen?—*A*. I am sure of it, they could rise to greater things and be much more useful.

Q. Do you think that factories would be willing to bear the expense of starting schools if Government rendered some aid?—*A*. I don't see why not. The Buckingham and Carnatic Mills have already started and other mills, in my opinion, would be willing also.

Q. The great bulk of the men whom you employ in your mills practically know no English and even those who do know would not be able to profit by lectures in English?—*A*. No, they know so little.

Q. You think that lectures in the vernacular would be appreciated by them?—*A*. That is what they tell me. The other day the Director of Industries sent round a notice that trade schools were going to be started in Madras and asked me to see how many men I could send along. I went round personally to our two local concerns, the Cement Works and Engineering Works, and asked the men if they would go. They said, no, they would not go. The three objections they raised are those I have written down and with which I fully concur.

Q. I suppose you are aware that a knowledge of English is much more widely spread in Madras than in any other province in India and yet it has not touched the labouring classes?—*A*. Not the skilled mistree.

Q. Nor do you think that a knowledge of English will be so widespread among the people that instruction could be given to workmen through it?—*A*. I think it will be a long time before they knew enough English to understand lectures.

Q. You advocate then that in all these industrial and trade schools the medium of instruction should be the vernacular?—*A*. Yes, undoubtedly.

Q. Regarding the training of the supervising and technical staff, you say that the Engineering College in Madras aims at turning out men more suitable for the Public Works Department than for commercial factories or mills?—*A*. That is my experience.

Q. That is why you have got to go to Bombay to get your supervising staff?—*A*. Yes

Q. You think then that if there was a technical college started here, many of the young men who now flock to law will be diverted to industry?—*A*. That is my idea.

Q. What is your opinion about the physique of the working men you employ; is it fairly good?—*A*. As judged by the standard of the English workman it is very poor.

Q. What do you ascribe it to; poor feeding?—*A*. The whole of their conditions are bad; they are brought up under bad conditions, hygienic, mental and moral.

Q. Do you think that they earn sufficient wages to have sufficient food to eat?—*A*. In many cases, no; I think their lot is pretty hard.

Q. I have been struck by the poor condition of the labouring men here; that is why I asked you?—*A*. They don't compare favourably with the Punjabee.

Q. You think that if they earned more wages, they would probably spend more on eating?—*A*. They might spend more on drinking as well. That is the trouble. They are very fond of the bottle down here.

Q. Is that evil growing?—*A*. I could not tell you. I know a lot of my best men are toddy drinkers. They spend a lot of their money on liquor.

Q. Do you find this evil growing only where there is a toddy shop in the vicinity of the mill?—*A*. It makes a considerable difference. I got an arrack shop shut up near our jute mill and it has had a somewhat good effect.

Q. I learnt recently that the Alliance Mill in Calcutta took care to have liquor shops removed to a distance and it had a good effect. Don't you think if you kept toddy shops away from the factories that the men are likely to give a better account of themselves?—*A*. I think it is quite the thing to remove them I have actually done so in one or two cases.

Q. It seems rather cruel that these men should have temptation placed in their way?—*A*. Yes, they come out tired, the toddy shop is close by and they walk in. It is an unnecessary temptation.

Q. You think that the expenditure which may be necessitated by the recommendations you have made will be nothing compared with the advance to greater industrial development?—*A*. Yes, that is the *mutlub* of the whole thing!

Q. In regard to the Advisory Board which you have suggested, you have said, in answer to Sir Fazulbhoy, that one of the members nominated by the Chamber of Commerce may be one nominated by the Indian Chamber; are you in favour of that?—*A*. Yes.

Q. [illegible] we [illegible] consideration and support?—*A.* There are only five members.

Q. Can you not increase the number?—*A.* I don't think you [illegible] Board.

Q. Do you think seven would be too many?—*A.* No, I dare say, not. [illegible] in regard to this Board is to get the right men. I am thinking of the [illegible] I have in my mind's eye. You mean that there should be two extra [illegible] be Indians? I had not thought of that.

Q. You know, after all, Indians are carrying on a great deal of business?—*A.* Undoubtedly, but not so much here. If it were in Bombay, it would be different.

Q. But you think it would be desirable from the point of view of Indian trade and commerce that there should be more Indians on the Board?—*A.* Yes. If you extend the thing to seven, and have three Indians out of a total of seven members, I would have no objection It might inspire more confidence and draw out more Indian capital.

Q. I see you are in favour of a college of commerce. Do I understand you to say that such a college would help to promote a knowledge of business?—No. I am not particularly in favour of a college of commerce. I don't think men will learn anything in a practical way as they would in a business house itself.

Q. You know that the export and import trade of India goes up to about three hundred crores and that the goods exported pass through Indian hands. Banking too is largely done by Indians except in the big banks, the Presidency Banks and others. In view of all that, don't you think that a regular business training, such as is given in industrially advanced countries in the West, would be very helpful in promoting business habits?—*A.* There we come again to the question of a man serving his apprenticeship whether he does that in office or under practical conditions.

Q. There is the theoretical and the practical part of training. You certainly want that the man who has to receive practical training should also be well grounded in the theoretical part, i.e., the principles which underlie the business, and that can be best imparted in colleges rather than in offices?—*A.* Yes, but I would do that in night schools or trade schools rather than letting the man go for one or two years to a commercial college.

Q. You are thinking of office hands whom you would recommend to go to night schools in the evening. Suppose you started with a better class of educated men; suppose there was an institution where they could receive this commercial education in banking or auditing of accounts, etc., things which would give them ideas as to how business is carried on; suppose you had such an institution and these young men were sent there, and afterwards joined your office, would they not be better qualified to deal with business?—*A.* They ought to be.

Q. From that point of view do you think that the establishment of such an institution would be desirable?—*A.* I qualify it by saying that it must be extremely well run.

Q. You have said that "excellent wagons can be made and are made in India and yet there is always a shortage." I understood you to say that you were struck by the amount of money that was sent out of the country by importing wagons?—*A.* The figure I gave was the total Government imports for last year, Rs. 680 millions. The greater part of that is for railway requirements.

Q. You think that in view of the large imports which have to be made and also in view of the need for many more wagons in this country, the Government should encourage the building of wagons in this country itself?—*A.* I do.

Q. With reference to one of your answers regarding the hydro-electric power schemes, did I understand you to say, in answer to Dr. Hopkinson, that in view of the advantages of having hydro-electric power made available in industries, the expense incurred in the survey should be acceptable?—*A.* That is my view, although I agree with Dr. Hopkinson that a very detailed survey will be costly. What is advocated is that a man who thoroughly understands what he is doing—such a man as Mr. H. [illegible] for instance should be put on to the job and inform the public that such and such hydro-electric power scheme could be started here or there. It would be [illegible] to industrialists, who would know what their power costs would be [illegible] would not have to buy coal.

Q. You would thus turn the water that is running to waste at [illegible]—*A.* That is the idea.

Q. In concluding your valuable note, you refer to the [illegible] The results of [illegible] Will you kindly tell us [illegible]

Q. To what part of the world do your working men go?—*A.* Oh, I think, they go to Fiji and Ceylon. I don't know really, but they go away from the district.

Q. Do you think it they did not emigrate they would find profitable work at home?—*A.* We are always short of men at our rice mills. We are putting in labour-saving devices because we cannot get the men. There are many other evil results ; the conditions under which the men are lured away ; they save a little money and are robbed before they can return to the country, as everybody knows.

Q. Very few people realise the evil results of the system : will you kindly tell us something more about it?—*A.* I know cases in which men have gone abroad and have saved some money and come back, and been robbed of it. There are people who make an absolute business of robbing them. I was thinking of the Tamil coolie who emigrates from Tanjore.

Q. By whom is he robbed ; by the man who recruits him?—*A.* Yes, he is one. He is robbed systematically. Then he is robbed as soon as he lands. People lie in wait for him ; I don't mean highway robbery ; I mean by subtlety.

Q. Have you ever had occasion to speak to some of these men who have returned?—*A.* Yes.

Q. Did you find that they were pleased to have come back?—*A.* They are very glad to come back, a great many of them.

Q. Do you think that in the interests of Indian industrialism this emigration should be discouraged?—*A.* I hold that very strongly.

Q. You think that the coolies will not be sufferers by not being permitted to go out?—*A.* I think so.

Q. You have said that you prefer *not* to train artisans in industrial schools ; but in view of the difficulty of finding accommodation for a number of young men who wish to receive a training in mills or factories, don't you think that industrial schools which have got workshops attached to them will give them all the preliminary training?—*A.* No, I don't. I went to a college in London and went through a workshop course. Afterwards when I served my apprenticeship in a big shop in the Midlands I found that I knew nothing. I was no use at all, although the college workshops I went to were the finest of their kind in Great Britain.

Q. Do you think you would have been able to appreciate better what you learned in the workshop, if you had not received that training?—*A.* Possibly, as I had to unlearn so much that had been taught me at College.

Q. You think that theoretical training should be imparted in schools, and should be followed by a training in workshops?—*A.* I do.

Q. But if there is a workshop properly fitted up with up-to-date machinery, and placed under a competent man—which is the essence of it—then that workshop may train the artisan very much better than anything at present that you know of in this country?—*A.* Assuming that a man can get training in a " pucca " college workshop, it might possibly be better than nothing. My own experience is that the practical instruction usually given in college workshops is an absolute farce.

President.—*Q.* Are you sure that it was better than nothing?—*A.* It certainly was not in my own case.

Q. You thought that the picture the Pandit put before you was better than nothing ; that it may be dangerous?—*A.* I would not go so far as to say that it would be dangerous but it would be little or no good.

Hon'ble Pandit M. M. Malaviya.—*Q.* Would that not depend upon who the man at the head was?—*A.* It may be, but in a college workshop you don't get a crack on the head or kicking into shape such as you would get if you are serving your time in a real workshop !

Q. Suppose you put a man through a school ; let him learn the theory and the practice of that trade as it is taught there ; let him then go to the workshop and receive the crack or kick to round him into shape?—*A.* To keep to the point at issue, I am not in favour of this workshop training in colleges.

Q. You don't think that workshops should be attached to industrial schools?—*A.* I don't think so.

Q. You don't really mean that you found it was no use ; you found that there was something more to be learnt in the workshop?—*A.* I found that I had not touched the fringe of practical work.

Q. I am sorry that the instruction was so poor?—*A.* It may have been my fault, but that is my view, that practical work in these kind of shows is no good.

Q. You refer to the Report of the Committee, in answer to Mr. Chatterton ; has that report been made public?—*A.* We were rather at cross purposes. There were two Committees, and I misunderstood Mr. Chatterton. The last Committee I was on was about trade schools. That was what I referred to.

Q. It is in this report that you and Sir Clement Simpson disagreed with the rest?—*A.* Yes.

Q. May I know the point on which you disagreed?—*A.* The main thing was about having men to teach who were skilled teachers. I hold that a man may be a very good man, an engineer or chemist, but he has got to learn how to impart his knowledge to *other people ; in other words, he has got to learn how to teach. That was one of the points. The second was having the instruction given in works or factories as opposed* to having a special building in the centre of the works and mills. At any rate I distinctly remember we put this minute in, dissenting from the other members' opinion.

Q. What was this other Committee that you refer to?—*A.* That was some time previously and was on industrial education.

Q. Has that also been published?—*A.* I believe so ; I think they are all published.

President.—*Q.* Did you take your diploma, and was it a three years' course?—*A.* Yes.

Q. And you served your apprenticeship afterwards?—*A.* Yes.

Q. You have been out here for ten years?—*A.* For 15 years. I have been ten years in this presidency.

Q. Have you managed to pick up the local languages?—*A.* The coolie languages I speak fluently, but I am not a Pandit or scholarly speaker.

Q. You say that the qualifications of the Director of Industries should be that he should have a good knowledge of the province, the people, and the language or languages of the province in which he is to be Director of Industries. Do you think this ideal can be duplicated anywhere?—*A.* I think it possibly could.

Hon'ble Sir R. N. Mookerjee.—*Q.* You consider that the increase of wages among labourers in India is mainly due to the emigration outside India?—*A.* I hold the view that emigration is largely responsible for increased wages and shortage of labour in the Tanjore district. I could not say all over India.

Q. Don't you think that it is a healthy sign that the wages of labourer has been increasing?—*A.* I was merely stating that in my opinion emigration was an evil, as amongst other things it has removed a large number of people from this particular district.

Q. I had understood you to say that on account of emigration all the wages in India had been doubled?—*A.* No, I did not say this.

Mr. C. E. Low.—*Q.* Under the heading of " Demonstration factories " you speak about high-grade jaggery factories. Has there been any experience of such factories in the Madras Presidency as far as you know?—*A.* Not as far as I know.

President.—*Q.* With reference to your suggestion that Government should assist you in connection with the supply of lime shells, I don't see what the point of your complaint is about these shells. Who buys the shells during these auctions?—*A.* The shells are excavated in certain areas which are owned by Government. These areas are periodically put up to auction. The result is that we never know what we have got to pay for our shells. A few years ago we used to buy shells at Rs. 60 a " garce " boat load ; now they have gone up to Rs. 120. I don't say that is entirely due to auction trouble, but it is very largely so.

Q. It means that the shells have found a market in other ways?—*A.* We are the biggest shell people here, but there is nothing to prevent such a thing occurring as occurred at the last auction. A skin merchant went out to gamble and he bid us all up so that we paid three times as much for the particular shells as had ever been paid before.

Q. Supposing you had left him with the shells?—*A.* We could not ; we had to keep our raw materials in sight.

Q. It simply means that you must have another source of supply. The first thing to do is to establish your other source of supply? You could not expect Government to fence you round until your industry was easy to provide?—*A.* We supply cement to the Public Works Department. There is limestone in Bezwada, we tried using that but the cost was prohibitive.

Q. The hide merchant sold you the shells afterwards?—*A.* No, he simply bid us up. He did not secure it. We had to go on bidding.

Q. Supposing you allowed him to buy the shells?—*A.* He did actually buy some other shell-pit areas, and burnt his fingers. Apart from all joking, my idea is that if the Commission could get Government to assist us in the supply of our raw materials, it would help to promote a local industry.

Q. You have not convinced us that we should look upon this as a national industry in the same sense as one that has to be protected?—*A.* First of all, it is the only Cement Works in this part of India, and far and away the oldest. It is worked under many disadvantages.

Q. Don't you get a price for your cement under present conditions, which warranted your outbidding the hide merchant?—*A.* This took place before the War. But what is to prevent other hide merchants coming out.

Q. The only natural way is that you should have another source of supply?—*A.* Government has proposed to start a royalty scheme for us. Our lease expires on the 5th March this year. I have been at work on this business for 18 months, and they promised to help us. We accepted the scheme that was put up and now they say "you have to wait another year" because under the rules this royalty scheme can only be worked with the Land Revenue people and not the Salt and Abkari. It will take another year before this royalty scheme can be worked. For a year we will be left and will have to go and bid at an auction on the 5th March.

Q. Why should there be a year?—*A.* I cannot tell you, but the fact remains. I was expecting this royalty scheme to come into force as soon as our lease expired.

A. Is your royalty based on the price of your cement?—*A.* No, there is nothing definitely fixed about that.

Q. In what way will the Government get the benefit of any increased profits? I suppose you will have your royalty reduced when you find you are making losses?—*A.* Yes, you mean that royalty should be paid in proportion to the market price ruling? Nothing has been settled.

Q. We cannot hustle that matter in any way. We cannot very well interfere with the private affairs of the Local Government that are in progress?—*A.* The point arises under section 10, and that is why I brought it up.

Hon'ble Pandit M. M. Malaviya.—*Q.* What is the proportion of the cost of the shells to its manufacturing cost?—*A.* Roughly speaking, cement is made of 75 per cent of shells and 25 per cent of clay, so that roughly speaking three-quarters of our raw material consists of these shells.

Q. What would be the proportion of the cost of the shells to the total cost of the manufactured article?—*A.* A ton of shells at present costs about Rs. 6 and the total cost of a ton of cement including all manufacturing charges is about Rs. 55 the cost of the shells is about 11 per cent of the *total* cost of the finished article or product.

Q. Has there been any rise in the price of cement during the last four years?—*A.* Yes, on account of the war there has been a great rise. It has very nearly doubled, but the manufacturing costs have also increased though not *pro rata*.

WITNESS No. 204.

RAO BAHADUR P. THEAGARAYA CHETTI, B.A., *Merchant and President, Southern India Chamber of Commerce, Madras.*

WRITTEN EVIDENCE.

This presidency is industrially very backward. We have no manufactures to compare with the cotton manufactures of Bombay or the jute manufactures of Calcutta. Agriculture is almost the exclusive occupation of the people, and the planting industry on the West Coast and over the Ghâts is, perhaps, the only industry so far organised and scientifically developed; but the industry is mostly owned by Europeans who are raising coffee, tea, cardamoms, pepper, rubber, etc. We have two weaving mills in the presidency. If we exclude the Government factories and the railway workshops, all that we could show by way of factory organisation is a number of rice mills besides cotton-gins and presses. Among minerals we produce only manganese in appreciable quantities and to a certain extent mica. We have no facilities for the generation of power and we are far away from the coal fields, nor do we enjoy the facilities of fine harbours or useful waterways, though in the matter of roads and railways we must admit we are fairly well supplied. There is no flow of private capital for industrial enterprises, and if there is any, it is only for petty industrial concerns from the small savings of the middle class population. The wealthy classes comprising the zamindars, Guzaraties, Marwaris, Nattukottai Chetties, and the lawyers generally, look for what they consider safe investments on mortgages of lands, houses and jewellery. With the rates of interest that are easily obtainable, money-lending is a very favourite occupation. If industrial enterprises are not undertaken, it is because people generally have little faith in the success of such ventures, and are afraid to employ borrowed capital on industrial undertakings. Joint-stock enterprise for the promotion of industries is also wanting, and we have not a stock, share or money market anywhere in the presidency. The educated classes do not give any lead in industrial matters and the present system of public education is too exclusively literary, without any facilities for acquiring technical or useful knowledge for a healthy industrial life. Scriptory and clerical service for a comparatively poor remuneration is all that the educated classes wish for and obtain. Our University has no provision for higher commercial education. A University man, if he is not a Government servant, is a lawyer or a teacher. The hereditary commercial and industrial classes have generally no pretensions to higher education. An educated business man is a rarity here. The only wealth that is produced in the presidency is by means of agriculture and the internal and external trade in the enormous quantities of food and commercial products that are raised from the land. So far as the external trade is concerned, it is generally a few European firms at the principal ports that carry on most of the business, with the special transporting and banking facilities they are able to command. Hand-weaving is the only cottage industry of any importance in this presidency. It has been estimated that there are about 400,000 hand-looms in the presidency, and while the hereditary weavers(who are still a considerable number in the Presidency, suffer from the stress of competition and in various other ways, especially from the want of dyes, the scope for hand-made cloth and articles of wear is considerable.

In any consideration of the industrial and manufacturing possibilities of our raw materials, which, I take it, is the aim and object of this Commission, our oil-seeds, which comprise ground-nuts, copra, castors, gingelly, cotton and mustard ; our raw cotton of which we raise several well-known varieties; our raw hides and skins which have an established reputation in foreign markets; our raw sugar, popularly known as jaggery ; and our fibres, deserve prominent mention. Nearly 5½ crores worth of oil-seeds were exported from this presidency in the last year before the war; after a very considerable local consumption of jaggery, about twenty lakhs worth of this article was sent mostly to the United Kingdom; including tanned, but unfinished, about 4 crores worth of raw hides and skins were sent out of this presidency ; and the value of raw cotton exported in the same year was over 3 crores. It is also noteworthy that France takes nearly 90 per cent of our ground-nut; Germany was taking 73 per cent on an average of our copra ; the United Kingdom was likewise taking 85 per cent of our castors and nearly the same percentage of our cotton seeds. These are average figures for the last four or five years of the pre-war period. A considerable quantity of the local output of jaggery is exported. Similar figures can be adduced for our other raw products which are in great demand in foreign markets for manufacturing purposes. By a system of tariffs, which, perhaps, I am precluded from urging before this Commission, our raw materials are all welcomed in far distant markets, while prohibitory import duties are imposed on corresponding manufactures from this country. Out of nearly 300,000 bales of cotton produced in the Presidency, less than 45 per cent is consumed by the local power spindles, hand-spinning having almost died out. Before the war, Germany bought considerable quantities of Madras tanned skins sold in the London market for their leather goods and the trade is now between the United Kingdom and the United States. These States also divide with Japan the trade in hides and skins raw. Our export trade in hides and skins is in unfinished though tanned goods. Our import figures will show that we are importing into this presidency over three crores worth of cotton manufactures ; over a crore worth of twist and yarns; nearly half a crore worth of refined sugar; besides soap, paints, leather goods, candles, boots and shoes; manures and other articles which are made out of our materials. We have made some attempts in lift irrigation by means of oil-engines. We have tried the chrome tanning of leather and the manufacture of aluminium into useful articles of daily use, both of which, however, have not materially advanced beyond the stage at which Mr. Chatterton left them years ago. Our attempts in enterprises, such as oil-pressing, and the making of glass, paper, pencils and candles are yet to prove commercially successful.

Our difficulties in the way of establishing manufacturing industries in the presidency are financial, scientific and technical, not to mention in this connection the apathy of the public and of the Government towards matters industrial generally. We have no facilities for importing suitable and efficient machinery, for the introduction of competent and skilled labour and for the adequate financing of any big industrial concerns. Our banks, banking firms and private capitalists would not generally advance money for the starting of any new industrial concerns or for the extension and improvement of any existing ones. We have no scientific or technical experts, in the service of Government or outside, who can be expected to advise on the nature of the machinery to be employed, the place wherefrom and the cost at which the same could be advantageously got, for any particular industry. The difficulties are even greater in procuring scientific assistance. At the last meeting of the Legislative Council an Honourable Member made the suggestion that the Government would be pleased to arrange for the employment of one or two Belgian experts for the making of matches, pencils, paper and glass in this presidency. The Government answered that if the Honourable Member would specify for which of the particular industries Belgian experts were within his knowledge available, they would then consider the information which the Honourable Member might place before them. It is for want of an expert that nothing could be done by way of glass-making in the glass factory which was taken over by the Government Department of Industries. The formulæ for the composition of glass are kept as trade secrets, says our Government Director, and an English chemist was employed to analyse various kinds of glasses to determine their composition, in view to future manufacture of glass. In these respects, Government enterprises would seem to be under no less difficulty than private ones. Costly experiments have been undertaken by the department without such experiments leading to practical results. To me it appears no earnest efforts have of late been made to demonstrate any industry successfully. Under the circumstances, private industrialists cannot be expected to come forward unless such experiments are demonstrated to be commercially successful. In the absence of facilities for higher scientific knowledge, knowledge of science in its application to industries, there is no room for any useful research work being undertaken for the discovery of new industrial possibilities or the improvement of any known ones.

Technical, industrial, commercial and scientific education must play a very large part in our educational system in the future. At least one central Technological Institute for the presidency and a net work of technical and industrial schools throughout the districts should be established. The pursuit of applied science in post graduate study should be greatly encouraged. The direction and control of technical and industrial education should be made the primary concern of the City Corporation and of District and Taluk Boards and of municipalities with proper regard to the industrial conditions, possibilities and requirements of the particular localities. Moreover every school must have an industrial side attached to it, and every boy attending school must be made familiar with the ordinary implements to work with. The presidency town must have a big workshop to train men for skilled labour, both for utilisation in factories and for teaching in up-country workshops. In this workshop the latest improved implements should be introduced for the training of skilled labour. I should also consider the utilisation for industrial and manufacturing purposes of our cotton, oil, sugar and leather as the key industries of this presidency, and I should lay stress on the importance and necessity for starting a number of pioneer factories for them. Spinning and weaving would include dyeing, printing and other industries and oil pressing would include industries, such as soap-making, candle-making, manufacture of paints and varnishes and the like. I should also lay stress on the developing of tanning and the finishing of leather and leather goods. As regards the kind of financial assistance to be afforded to industries, I would not suggest a hard and fast rule but would leave it to the Government Department of Industries to afford such assistance as they consider most suited in the circumstances of each case, advised, if necessary, by a Board of Advisors, in specified matters. So far as the Government are concerned, I expect them to start a number of pioneer industries and demonstrate their commercial and practical success. I also expect them to undertake a well-organised system of banking for industrial purposes. The provincial Governments should be able to allot a specified sum in their budgets every year, as they do for agricultural experiments and demonstrations and the carrying on of the work of the department. I am not offering any suggestions regarding the details of industrial banking, but I content myself with merely emphasising the absolute necessity for the same. I anticipate in any system of industrial development in the future that the Government would recognise that it is one of their normal functions to assist, encourage and bring about substantial industrial development from year to year. Regarding an official organisation for the province, I consider the existence of a special department controlled by a scientific and technical expert at the top as essential. I would suggest his being assisted by a number of other experts, who must be able to organise and run the several important industries, advise and assist those who may seek their assistance. When once the selected industries are proved to be commercially successful, they must be handed over to private agencies who will be ready to take them over. The training of competent Indians in sufficient numbers to gradually take up and run the industries, without further expert assistance, should be the aim of the departmental experts. The department should also undertake surveys for industrial purposes, prepare industrial schemes and projects in advance, with details of the cost, machinery, labour, raw materials, manufactured articles and the markets for the same. The preparation of such plans and estimates should be one of the ordinary duties of the department. It may be that experts of the kind I propose will involve a considerable expenditure to Government, but the resulting advantages will far outweigh the cost.

Hand-loom weavi

In the early sixties, when the Lancashire cotton goods were imported in large quantities, there was an apprehension that the indigenous handloom would disappear. The fear was aggravated when by the famine of 1876-77 the weaving community was very severely hit. This community was the first to suffer from the famine, and considerable numbers were forced to seek relief. Since then, its condition was one of continued suffering and difficulties. But for the accident of the introduction of the fly-shuttle attachment to the common pit-looms, there should have been absolutely no improvement and the class, which successive censuses showed was at best stationary, would have much dwindled ere now. Some ten years ago, a weaving competition and exhibition was held under the auspices of the Local Government, and with the efforts since made by Government to popularise the fly-shuttle slay, it looks as though the hand-loom industry which was dying has a good future before it. Mr. Chatterton did not think well of the pit-loom with fly-shuttle at the time and was not hopeful that the lot of the hand-weaver would improve thereby. If he will excuse me, I may say he was even opposed to it. But the exertions to popularise it proved eventually successful, and a special census taken five years ago disclosed the fact that there were 20,000 looms in the presidency with this special attachment. I believe at present there are over 100,000 looms of the kind and the number is increasing steadily and satisfactorily. The condition of the weavers has considerably changed for the better, particularly in the East Coast districts. They have emerged from their indebtedness to sowcars and are standing on their own legs. The fly-shuttle is promising to prove a boon to the weaver. Improvements in warping, sizing and beaming will further help the industry. Sizing by machinery has been tried by Mr. Chatterton, but the superiority of hand-sizing cannot be reached. Further attempts in this direction as well as in beaming are urgently called for. Since Mr. Chatterton left the Department of Industries in Madras, work has stagnated, and nothing useful in these directions has since been undertaken. A State-scholarship man was brought in some time ago, but subsequently what became of him I do not know. In the Madras Exhibition of last year, a special loom for weaving solid borders was exhibited, with a young Indian in charge of it. It struck me that it might not succeed at that stage, as there were considerable difficulties yet in the way, and the man was in charge of it only for a month then. What has been done since is not known. If that loom succeeds, it should help the weaver greatly. It should give a spurt to the hand-woven dhoti and in these war days it will prove a triumph for the hand-loom. But unfortunately, the Government Department of Industries does not appear to care much for this branch of work. The hand-loom has held its own till now, owing to the conservatism of our ladies. The war has given unexpected impetus to the industry, but it has also, at the same time, brought us an unexpected difficulty by the stoppage of German synthetic dyes. In the pre-synthetic-dye days, indigenous dyes were our only resource. Madder, which is most used for the red dye, cannot of course be had in abundance now, but steps may be taken to cultivate the root extensively. Sappen wood, red wood, different kinds of flowers and leaves, jaffer seed and cutch are the several dyeing materials of the country which can all be had if proper endeavours are made; and if experts will only direct their attention scientifically to produce dyes out of them, the days of indigenous dyes may not prove so hopeless as our Dye Expert in Madras would make us believe. Notwithstanding the fact that it is rather a hard job to the country dyes, such dyes are believed actually to improve the strength of the yarn dyed and to obtain good and fast colour. It was with the Chey root that the famous Madras handkerchiefs, which enjoyed an established reputation in the East India Company days, were prepared. I do not see how experiments made with the indigenous dyeing materials in the United Provinces have been pronounced to be successful, while similar experiments made locally and in the Institute of Research at Bangalore have been condemned as useless.

The present position of indigo is really bright, though we do not know how long the present change may continue. The extent of cultivation has considerably increased since the war began, and so also production. Madras has been supplying recently considerable quantities of this natural dye. It is a pity that the Indigo Expert of the Government of India has not yet turned his attention to the industry on this side, though he is reported to be doing much for the Bihar planters. A rough analysis of the several varieties of the Madras product would show the proportion of indigo tin varies in proportion to soil, water and the play of rain and sun on the crop. It will be useful to know what makes the changes scientifically, so that with the help of such knowledge the inferior varieties can be improved. The ryots are apprehensive of the future of indigo after the war, and we, in this presidency, are anxious to have the full benefit of the scientific standardisation of indigo which a Government of India expert is said to be attempting for the planters of Upper India. It is claimed for the natural indigo that it preserves the cloth and imparts warmth; and this is said to be the reason why in Army contracts for coloured cloths a clause is always inserted that the dye used should be natural indigo. If all this is so considering the great extent and scope of the industry in this Presidency I would suggest definite steps being taken for the scientific development of the growth and manufacture of natural indigo in this presidency.

The object of the Government of India in appointing this Commission has been stated to be to suggest ways and means to secure the building up of industries where the capital, control and management shall be in the hands of Indians. The warning has also been given that this object may not be secured if the manufacturer who now competes from a distance transfers his activities to India and competes with us within our own boundaries. Already, the competition of Indo-European enterprise in commerce and industries with Indian industries is very keen. The former is able to command facilities for the supply of capital, transport, banking, skilled labour, and scientific aid on a scale which Indian enterprise cannot possibly hope for. The European business community in this country has a solidarity of its own on account

of prestige and influence with the Government of the country which secures them all the help they want. I would therefore urge that the recommendations of this Commission should be so conceived and framed as to secure the expansion and development of Indian indigenous manufactures and industries solely.

I append below my answers to certain questions in the list—

Capital.

Q. **1.—In 1910, I attempted to raise a capital of 12 lakhs of rupees for cotton spinning and weaving mills. With much difficulty I was able to find only a capital of four lakhs, and this mostly from merchants and small capitalists. The undertaking was eventually given up as impracticable. In the next year, I endeavoured to float a company for the manufacture of cement with a capital of three lakhs of rupees. I was able to find only half the sum, and this attempt also likewise proved impracticable.** Just before the war, I tried to start a match factory with a capital of two lakhs, All that was subscribed was a lakh and a quarter, and before attempts could be made to find the balance, progress was suddenly arrested by the outbreak of the war and the consequent impossibility of securing the required machinery. In this case, even the construction of the building had begun. From my experience, I am able to say that there is a tendency among the small capitalists, merchants and also ryots, to seek investments in industries. I cannot say the same thing of the educated classes and of the learned professions. The suggestion which I would make is to expand the co-operative movement and extend the operation of co-operative societies as I find such societies are able to attract investments and to lend at comparatively low rates of interest. I am of opinion this movement will eventually reduce the rate of interest now paid on agricultural securities and that much useful capital may in the long run be diverted for the promotion of industries.

Q. 3.—I know of a large number of rice mills recently started in several northern and southern districts. These are not maintained in full-time employment, with the result the enterprise suffers in several ways.

Government assistance.

Q. 4.—I am not aware of any financial aid given by the Local Government for industrial enterprises. I may, however, mention that for the projected match and paper factory in Travancore, the Government of that State offered very substantial concessions though not financial aid.

Qs. 5 *and* 6.—As regards the method of giving Government aid to the existing or new industries, I think the several methods indicated may all be tried, except money grants in aid and bounties and subsidies in which I have little faith. I would recommend the grant of loans on the security of machinery and buildings, at a low rate of interest. Whenever such financial assistance is afforded to industries by Government. I am in favour of such control being exercised over them as could be secured by means of financial audit of their accounts. I would restrict the aid of guaranteed dividends to untried industries in this country; and in the case of hire-purchase system I should impose the condition that the cost of the machinery so hired should be calculated at a rate, not exceeding a 5 per cent interest basis. The provision of share capital by Government does not also appeal to me as workable. I am not in favour of Government officials holding seats on Managing Boards. I do not see why the Government purchase of suitable products should be restricted to limited periods.

Pioneer factories.

Qs. 7 *and* 8.—So far as I have known, the two pioneer factories started in Madras have proved a success, but for several years past no further enterprise in this direction has been undertaken. When pioneer industries are commercially successful they should be handed over to capitalists at actual cost or at proper valuation. I am not for Government undertaking any industries on their own account. At all events they should, under no circumstances, undersell articles produced by private concerns.

Technical a scientific depa ments.

Qs. 64 *to* 72.—I would recommend a thoroughly well-equipped laboratory with all modern equipments in a central place in India with branches in three or four of the presidency capitals. These laboratories instead of depending upon experiments made in England for results, should undertake actual experiments in this country. The undertaking of research work in these laboratories should also have the object of **training young men of promise in original investigations and enabling them eventually to undertake valuable scientific work. I should place the association of Indians and familiarising them with research work as one of the foremost aims of research institutions in this country. In importing experts I would insist that they be real experts, and not inferior men posing as such.**

ORAL EVIDENCE, 22ND JANUARY 1917.

***Mr. A. Chatterton.**—Q.* **You have a good deal of experience in industrial and pioneering work in this presidency and you make many experiments yourself especially in connection with hand loom weaving. Am I right in assuming that you are practically the head of the weaving community in this presidency, that you have a very large amount of influence with the weavers and are looked upon by the weaving community as their head, and that you have started a hand-loom factory?—*A.* Yes.**

Q. I think the Commission would be glad to hear your experiences connected with this attempt to develop hand loom weaving. Is the factory still at work?—*A.* I have no men to learn. I did not begin with the object of having a factory but only just as a school.

Q. You worked it on practical lines?—*A.* Yes.

Q. What we want to know is how such an enterprise was looked at by the weavers themselves. Did you find any difficulty in getting the weavers to work in the factory?—*A.* Yes.

Q. Did you find any difficulty in getting them to keep regular hours? What are the reasons for the fact that all the attempts made in this presidency in this direction have not resulted in any very large development of the small factory system?—*A.* Weaving is a home industry where the men, women and children work. If it is a factory only the males will go and it will be very difficult for women to go there. Once the males and the females go out of the house, their children will be left uncared for and women especially have to perform so many domestic duties such as to maintain the children, cook the food for the family and there are so many other things that women in our homes have to attend to, that it is not easy for the female to go out and work in the factory.

Q. With the experience that you have and the knowledge of other undertakings of a similar character do you think it is practicable to develop this idea of improving the condition of the weaver in small factories?—*A.* I think it will not work.

Sir F. H. Stewart.—*Q.* Do you think that it must remain a home industry?—*A.* I think it is very good that it continues as a home industry.

Mr. A. Chatterton.—*Q.* You say in your note "I believe that at present" there are 100,000 looms and that the number is increasing steadily and satisfactorily?—*A.* Yes.

Q. The figures given to us officially are much smaller?—*A.* When were these figures given?

Q. The figures were given a few days ago?—*A.* I should say that the figure now is more than a lakh. I asked a question in Council some five years ago asking for figures and statistics and it was 20,000 then.

Q. In what parts of the presidency has this development taken place?—*A.* In Madras alone you will find more than a couple of thousands, in Madras City itself.

Q. Is that development due to the peripatetic teaching that the Government have started?—*A.* I am not going to credit the peripatetic schools to such an extent. They have not done much.

Q. What is the reason, why in certain parts of the country weavers are taking to fly shuttle looms whereas in other parts they do not?—*A.* I do not know the conditions in different parts of the presidency to say why they do not take to it. But I know that when they see the utility of it they do take to it very well.

Q. You have got many weaving centres like Coimbatore, Madura and Tanjore? Have they all taken to this loom?—*A.* They have not, because the kind of work that they are doing cannot be done on this machine.

Q. You mean in reference to border cloths?—*A.* Yes.

Q. Apart from the border cloths are they using these fly shuttle looms in those parts of the country?—*A.* They do. The other day I was at Coimbatore. Several weavers were using this but not for this kind of work.

Q. Do you think that the organisation of the weaving trade and hand loom weaving is the preliminary to any considerable development of the technical methods of working?—*A.* No.

Q. Do you think that the hand loom weaver has a sufficient market for his goods?—*A.* Yes. He cannot produce all that is wanted now.

Q. We have been told a very different story in other parts of India?—*A.* At least in this presidency what I say applies.

Q. A witness this morning gave us some information on the subject of the Madras handkerchiefs. You had some experience in that direction. Are you still working these Madras handkerchiefs?—*A.* Not now. I have done a good deal in the past. I know what it is now.

Q. Why is it that although there is a large demand abroad for these Madras handkerchiefs the supply is not equal to the demand? What is the particular difficulty that the weavers experience in making a class of goods that would satisfactorily pass the market tests?—*A.* I think the miserable aniline dyes are the ause.

Q. You put it down to that?—*A.* Yes.

Q. We were told this morning that in certain places round the Ponneri taluk they made a very high class handkerchief?—*A.* They do, but the dyes are so bad hat they lose much of their value.

Q. Is that due to circumstances arising out of the war?—*A.* No.

Q. Did the conditions exist before the war?—*A*. Yes.

Q. The methods of dyeing the yarn were unsatisfactory?—*A*. Very.

Q. Most of the yarn the weavers do themselves?—*A*. They were dyeing it with their own dyes but they found the aniline dyes cheaper and easier.

Q. There is another matter on which I should like your opinion. You have some experience of lands under irrigation and the lifting of water by pumps. What is your general opinion on that point? Has it been a profitable investment of money?—*A*. I think so. It ought to be because it improves the produce on land a good deal.

Q. How long does your experience date back?—*A*. My experience dates back to ten years.

Q. Have you got your first engine still working?—*A*. Still working beautifully.

Q. How many have you got?—*A*. A dozen.

Q. And what are you using as the source of motive power, gas engine or oil engine?—*A*. Both.

Q. How many of each?—*A*. Two gas engines and ten oil engines.

Q. Do you find that a profitable method of lifting water?—*A*. Certainly.

Q. And you got a good return on the money invested?—*A*. I should think so.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. Will you tell me about your association? Are they all commercial members?—*A*. All are commercial members.

Q. How many are there?—*A*. About 150.

Q. Are they individuals or firms?—*A*. Both.

Q. Are they small petty men?—*A*. No. They are mostly very big men.

Q. You say that with the rate of interest easily obtainable money lending is a favourite occupation. What per cent?—*A*. Formerly it went up to 20 to 30 per cent. It has now gone down considerably and the present standard may be taken as 12 per cent. If the co-operative system works successfully for some time more it will bring down the rate considerably.

Q. How are the co-operative societies financed here?—*A*. There is one central urban bank which is financing a good deal and there are two other banks, one in Madura and the other in Tanjore. I believe there are two or three.

Q. You say that the hereditary commercial and industrial classes have generally no pretensions to higher education?—*A*. They are not graduates of the University.

Q. They do take some amount of education?—*A*. Any amount that can be called education. But they are not graduates of the University.

Q. We have often heard that there are no Indian directors in the Bank of Madras and that Indian commercial people do not get any help. Can you cite any cases?—*A*. I do not know the internal working of it. As far as I know the angle of vision, as it is called, is quite different in the case of Indians compared to what it is in the case of Europeans.

Q. Is the Bank of Madras doing a good deal of business with the Indian commercial men also?—*A*. Mostly with money lenders.

Q. You say that technical, industrial, commecial and scientific education must play a very large part in our educational system in the future and that at least one technological institute for the presidency and a network of technical and industrial schools throughout the districts should be established. Do you want this to be on the principle of the Bombay Technical College or on some different principle? Have you seen the working of the Bombay Victoria Technical School?—*A*. I have seen that. I would have this on a much more elaborate basis.

Q. You want it to be a higher grade one?—*A*. Yes.

Q. Is there any college like the Commercial College of Bombay here?—*A*. No.

Q. You say that the direction and control of technical and industrial education should be made the primary concern of the City Corporation and of District and Taluk Boards and Municipalities with proper regard to the industrial conditions, possibilities and requirements of the particular localities. Do you think that these institutions should be under the Corporation or under the Director of Industries?—*A*. I think it ought to be under the Municipalities and District Boards because the members of those bodies would take a personal interest in the matter. That will give an impetus to instruction which would not be the case if the thing was under the Director of Industries.

Q. But a Director of Industries would know a lot more about technical schools?—*A*. I do not know. He might supervise.

Q. The Local Board might contain some members who might delay matters for months and months while a business body can do the thing at once?—*A*. I should think that the Government organisations work infinitely slower than any other body in the world.

Q. Will business people be able to do the thing much better?—*A*. We can get business men for that kind of thing. This Board contains business men.

Q. The other men will also take an interest in the thing?—*A.* As far as my experience goes I can authoritatively say that if a man is taking an interest and does things well others will soon come in also. Then there will be no lagging behind.

Q. Don't you want the Director of Industries then in connection with these schools?—*A.* He may do the supervising work. The actual work must be in the hands of individual bodies. Now and then he may assist with his information and opinion.

Q. You will confine him only to suggestions. At present the literary education is under the control of the Government?—*A.* We have experiences of our own in that matter. At present the education is in the hands of the Director of Public Instruction and we know what the result is. We have not been getting what we ought to.

Q. You suggest the formation of an industrial bank to finance the local undertakings. Can you suggest any scheme as to the way in which they should be worked? Should Government guarantee interest for a certain number of years? If the Government guarantees 5 per cent on the capital for a period of five or ten years do you think that would be sufficient to attract local capital?—*A.* I think it will be a splendid success.

Q. You know that in the case of these industrial banks we want deposits for longer periods that cannot be called in, say, six months or a year. Do you think that with Government guarantee people will subscribe?—*A.* Certainly.

Q. Suppose the bank issues debentures will they also be taken up?—*A.* That will be taken up.

Q. And how are they going to give the money?—*A.* In the first place you must see that the people turn the money to good account. The money will be advanced on the security of the machinery and the plant and the building. There must also be a little bit of control by having Government audit. I am against Government Directors.

Q. Do you mean that the money should be given by the Government and that they should see that the security is good?—*A.* Yes.

Q. You say that you attempted to start a spinning and weaving mill with a capital of 12 lakhs and that you were not able to get the capital. There are spinning and weaving mills in the Madras Presidency which are fairly flourishing?—*A.* It is true that there are three spinning mills which are working very well. The capital of one is from Bombay. The capital of the other two is here but they are managed by an European body and the Directors take no interest in the matter whatever.

Q. Was it a company started with English capital?—*A.* No. There are Indian shareholders also. The shareholders did not get any profits up to four or five years ago.

Q. Is there not weaving too?—*A.* There are two mills and their bad results are due to certain circumstances and I do not think it right to tell those circumstances here. If these two mills had been in other hands there would have been a hundred mills all over the country by this time.

Q. Would you have any objection to mention that in confidence?—*A.* No.

Q. About the co-operative societies you think that there ought to be industrial co-operative societies and that they must help the cottage industries. How is the hand loom industry financed?—*A.* By private capitalists.

Q. They give the yarn on loan to the weavers?—*A.* Sometimes.

Q. The poor hand loom weaver is not better off?—*A.* Now they are better off. There are 100,000 hand looms much better off than they were five years ago.

Q. Because they are independent of the sowcars?—*A.* Yes.

Q. You are not in favour of grants-in-aid, subsidies, etc.?—*A.* No. It will spoil the business.

Q. Do you know the system in Japan and Germany? They have given subsidies to encourage companies?—*A.* I understand so from what I have read.

Q. Don't you think that that can be followed out here?—*A.* I think it may be followed under certain circumstances and that is if all are looked alike I think it will work well.

Q. What do you mean?—*A.* If you and I are looked alike by the Government then that sort of thing can be done.

Q. Then you say that you are not in favour of Government officials holding seats on the Managing Boards?—*A.* Yes. It would completely demoralise them.

Q. Do you think that the Board of Industries might consist of members sent up from the different Chambers?—*A.* Yes. I was hearing the evidence of Mr. Scott Mackenzie. I have been a member of the Corporation for many years. He was saying that the Corporation President will be able to purchase lands for factories and so on. I was in the Corporation for a long time and I know the working of it. The President has no control whatever in the purchasing of lands. This is done by the Collector of Madras.

Q. Is the President an official?—*A*. There is an official President. In the working of the Madras Corporation the President has no control whatever in the purchase of private lands. The Collector of Madras purchases it for the Corporation. Whenever the municipality wants land it would apply to the Collector.

Q. Are there any other Indian commercial bodies like the Southern India Chamber of Commerce?—*A*. There are any number of bodies in Chicacole, in Cocanada, in Berhampur, in Tuticorin, etc.

Q. You say that Government should purchase the local products if they are found suitable?—*A*. If the articles can be got in the country I do not see why the Government should go in for the foreign articles. Only they should see that the articles are of good quality.

Q. What about the Stores Department? Do you know how the Government buys?—*A*. I do not know anything about it. It may be that private merchants here will be able to buy, and supply cheaper than in the case of Government buying direct.

Q. You say that you are not for Government undertaking any industries on their own account. You do not object to Government pioneering industries?—*A*. Certainly not.

Hon'ble Pandit M. M. Malaviya.—*Q*. You think that it would be a good thing if there was an industrial bank attached to the Presidency bank or if there was a separate industrial bank. Do you think that it should have branches established in different industrial centres in the province?—*A*. It would facilitate business if there were branches in all the big centres. There is a good deal of business in the mofussil stations. All the work cannot be done in the head office alone.

Q. You want this bank to finance the larger industries? And for the smaller industries you want an expansion of the co-operative movement?—*A*. Yes.

Q. With reference to the Presidency Bank you have said that the angle of vision is not the same in the case of Indians and Europeans. Do you think that is due to the absence of an Indian Director on the Bank of Madras?—*A*. I do not think so. The presence of one or two among a dozen will not make much difference.

Q. What is the present number of Directors?—*A*. I do not know the number.

Q. Do you think that if you had half the number of Indians that would be sufficient?—*A*. It must be proportionate. It may be a little less.

Q. Even if you had one-third of the Indians, that would be sufficient?—*A*. Yes.

Q. The angle of vision will then alter?—*A*. Yes.

Q. Could you mention any concrete instances in which Indian commercial firms have found difficulty in obtaining accommodation at the Bank of Madras?—*A*. I suppose Mr. Kuddus Batcha will give evidence before the Commission. He will be able to explain to the Commission and he can give the Commission his own experiences.

Q. You say that in this presidency some of the flourishing industries in the west coast are in the hands of Europeans. Have not the Indians imitated the examples of these?—*A*. They have, but they are a small minority.

Q. Some Indians are taking to it?—*A*. Yes. These Europeans have great influence in the west coast like Cochin and Travancore Governments.

Q. Do the Presidency Banks do a great deal of business with the Indian dealers?—*A*. They do business with the sowcars.

Q. They deal with sowcars and not with commercial people?—*A*. Yes.

Q. You suggest here that the educated classes do not take sufficient interest in industrial matters owing to the defect of the present system of education. You think it is too literary and it does not give facilities for acquiring useful knowledge?—*A*. Yes.

Q. You think that if technical and commercial colleges were established people will not flock to law and Government service as they do at present?—*A*. Yes.

Q. With regard to the raw products of this presidency which are of immense value, do you think that if Government started demonstration factories then private enterprise will come forward?—*A*. Yes.

Q. You said that if certain mills were in other hands then there would have been a hundred mills? Would you like to explain that in camera?—*A*. Yes.

Q. Do you think that you will be able to develop the manufacture of cotton to the extent that they have been able to do in Bombay?—*A*. It requires a good coal supply which is so bad here. If some facilities were given in that direction then the thing would work well.

Q. In what way do you think that some concession should be given to the people in this province in the matter of coal?—*A*. Coal transport.

Q. If this industry is to grow here?—*A*. Yes.

Q. With regard to sugar, the manufacture of sugar and jaggery, what are your difficulties?—*A*. The Abkari Department is a source of obstruction. Some tracts are given to firms for distilling liquor. Those firms use molasses and some portion of sugar and they only can compete in producing jaggery or anythnig like it. If that restriction is not there I think there would be a good many sugar factories and in the case of palm jaggery there is a good deal of zuloom by the Abkari Department.

Q. In what way?—*A*. The tapping of palms requires the payment to Government for excise duty. If you go from here to Cape Camorin you will find all along millions of palm trees. But very few of them are utilised because the Abkari Department will not allow them to be tapped for sweet toddy to make it into jaggery. For sweet toddy they have no duty. Duty is put upon trees for toddy drawing that is used for drinking purposes. If one wants to tap a hundred trees for toddy he may have a licence. But if any toddy drawer draws toddy from a tree which is for jaggery purposes then they will simply *pakro* him and prosecute him under the rules. And people who used to draw sweet toddy for making jaggery have therefore left the business. If the Abkari Department do not give this trouble there will be a good deal of palm juice and any quantity of sugar and jaggery can be made in the country.

Mr. A. Chatterton.—*Q*. Do you refer to date palms or palmyras?—*A*. The palmyras.

Q. Apart from these palm trees and palm sugar, in the matter of cane sugar do you think that, if Government permitted molasses to be used for making industrial alcohol, the difficulty would be solved to some extent?—*A*. To some extent it will be solved. People are now taking to small jaggery manufacturies. I believe you remember the Singanallur factory. For some time it was not working. For the last two years they are working very satisfactorily.

The tanning industry has been developed to some extent in Madras?—Yes.

Q. It is only a question of private enterprise taking up the trade on a large scale?—*A*. Scientific knowledge is wanted.

Q. Do you think that a well equipped school of tanning would be useful?—*A*. And if the tariffs are also taken into consideration I think we could work very well. We can produce very fine leather for export.

Q. You know that an expert tanner was appointed and that he has left for Mesopotamia. That is the chief reason why the school is not doing any work. You have every reason to hope that when the military situation is eased there will be quite a good school of tanning here?—*A*. I hope there will be. The scheme is no doubt a good one but it should be worked.

Hon'ble Pandit M. M. Malaviya.—*Q*. You referred to the question of tariffs. If the Governments of other countries imposed a heavy duty on imported leather how can the Government of India help it?—*A*. That is a very big question. I do not think that the Commission has it within its scope of enquiry.

Q. With reference to oil pressing what is the difficulty that actually stands in the way of developing oil pressing on a large scale in this province?—*A*. Our difficulty is that we cannot prepare oil that will suit western markets. That requires scientific knowledge.

Q. Do you want a demonstration factory established for that purpose?—*A*. The Department of Industries has done something but very little I should say.

Q. You think it can do a great deal more?—*A*. A good deal more in that direction. Only proper men are to be put in there.

Q. You think that Government should start demonstration factories to show improved methods of oil pressing and then you think that private enterprise will take up the business?—*A*. Surely.

Q. There have been some attempts at glass making in this presidency. I understand you were connected with a glass factory?—*A*. I was sometime a shareholder and a director.

Q. What was it called?—*A*. I forgot the name. It was the Madras Glass Works.

Q. Is it working now?—*A*. It is in the hands of the Industries Department.

Q. Can you tell us why it failed?—*A*. First of all want of scientific knowledge on the part of the manager. Men were brought out who would not do anything but simply pretended to be superintending.

Q. Do you refer to the Manager or the Superintendent?—*A*. The supervisors and the actual manufacturers and then there was the management itself. It was a very costly one and the whole capital was utilised in that way. Just at the end it was found that it could be worked satisfactorily by having a continuous furnace It is a question of oven which is to be kept hot all the day. If they had worked it continuously they would have made it a successful concern. By the time they came to know about it their capital was over.

Q. You say then that it is a question of finance and good management, and that with a less costly management the concern could have been a success commercially?—*A*. We wanted some estimates for machinery to work the factory all the 24 hours and it was found impossible to carry out the estimates. It was too costly. We got estimates from America which was one-third of what was quoted from England and they even promised to send their foremen here to fit up the machinery, but the whole thing was smashed for want of capital.

Q. It was smashed only for want of capital?—*A*. Yes. Now if the Department of Industries were to bring the machinery from America they can do the thing very cheaply.

Q. You do not think that Government need do anything more?—*A*. I think private parties will take it up.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. Is the factory now in Government possession? Have they acquired it outright?—*A*. They have purchased it for experimental purposes.

Q. You think then that this glass industry has a good future before it?—*A*. Certainly and our workmen are only of the fishermen caste.

Hon'ble Pandit M. M. Malaviya.—*Q*. It has been said that the difficulty of getting cheap coal is a factor which goes against the success of a glass factory here. What do you think about it?—*A*. Of course if you are using very good coal there will be difficulty, but we found from our inquiries that coal of ordinary kind can be used.

Q. You think then that that difficulty will not stand in the way?—*A*. No.

Q. With regard to paper you have said that some attempts have been made here? Have they succeeded?—*A*. There was a factory at Punalur. It has not succeeded to my knowledge.

Sir F. H. Stewart.—*Q*. Have you any personal knowledge of the experiments?—*A*. I know that it was working with rotten gunnies and old paper and they were doing it very well for some time. Whether they gave any profit I cannot say. It was a concern of the Travancore Government. The Industrial Department have taken it up and they are running it. There was no wholeheartedness in doing the thing and that was the cause of the failure.

Q. As regards pencil, have you got a successful pencil factory?—*A*. The Industrial Department is running it.

Q. It is still in the hands of the Industrial Department. They have not handed it over?—*A*. I do not think they are very successful. They are doing something with it.

Q. And with regard to candles?—*A*. That is in the hands of private firms. I know nothing about them.

Q. You recommend the establishment of one central technological institute for the presidency and a net work of technical and industrial schools throughout the districts for the development of industries in the country. Do you think that one central technological institute should be established for each province?—*A*. Yes, because the conditions of the different provinces vary very much. The experience of Bengal would not help Madras. There is no use of one institution for the whole country.

Q. Why do you think that in every school there should be an industrial side and why are you in favour of drawing and manual work being made compulsory?—*A*. The reason is this. No sooner a boy gets into a school than he thinks that he is a superior being and he does not stoop to work. That kind of idea must be got rid of. When he works with his hand in the school from the beginning he would not feel that he is a superior man and he will get accustomed to manual work, and when he gets accustomed to that he will be all right. Drawing and other things would do very well.

Q. So far as the Government are concerned, you advocate that they should start pioneer industries and demonstration factories and that they should help in establishing a well-organized system of banking?—*A*. That is absolutely necessary.

Q. You think that with this much of support from the Government the industrial future of the presidency will be satisfactory?—*A*. Yes.

Q. Is it a fact that hand-woven cloth is preferred by the people to mill-made cloth?—*A*. Yes.

Q. Is it due to its better sizing?—*A*. It is due to better sizing which gives durability.

Q. Does it also last longer?—*A*. Yes. Much longer.

Q. Is it a bit costlier than mill-made cloth?—*A*. Yes. A little costlier.

Q. But it does last longer?—*A*. Yes.

Q. You do not apprehend that the hand loom industry will be killed by the power loom?—*A*. I am not afraid.

Q. You have said that the aniline dyes have taken away the beauty of the hand-made cloth. Has that affected the sale of the hand loom cloth?—*A*. With the aniline dyes the colour fades on wear.

Q. In preparing silk and cotton cloths, are not the indigenous dyes still largely used by the hand loom weavers?—*A*. Not very much.

Q. The look of the cloth will be more agreeable to the eye if indigenous dyes were used?—*A*. Yes.

Q. You think that the Government should give special attention to the promotion of the indigenous dye industry?—*A*. Yes. That was my trouble with Mr. Marsden when he came here. I took him round and tried to convince him. But he had his own views.

Q. You contemplate the development of a great manufacturing industry in this province through mills. Do you think that even when that time arrives the hand loom industry will be able to maintain itself?—*A*. I think it will. The finer cloth cannot be made successfully with the machines so nicely as we make them on the hand loom.

Q. Is it your opinion that this hand loom industry will develop further?—*A*. If you can make it a little cheaper in sizing and weaving.

Q. You think that with that much of help the industry has a good future before it?—*A*. Yes; but it is a very difficult matter.

Q. You think that the industry being of such importance the Government ought to award prizes and also encourage the extraction of dyes?—*A*. Yes. I do not know whether the department has done much in this direction of late.

Q. You say that something definite and practical must be done to secure to the weaver a hand loom which will make the solid borders?—*A*. Solid borders and the mixed borders.

Q. With regard to indigo, has the use of indigo revived since the war began?—*A*. Yes.

Q. Do you think that it will continue after the war?—*A*. It is a question of price.

Q. You say "I do not see how the experiments made with the indigenous dyeing materials in the United Provinces have been pronounced to be successful while similar experiments made locally and in the Institute of Research at Bangalore have been condemned as useless." When was that?—*A*. Only lately.

Q. You say that the Indo-European enterprise in commerce has been very keen and you want a special recommendation from the Commission with a view to securing the expansion of Indian indigenous manufactures and industries solely? Do you agree that a good system of technical education would prove of great benefit in that direction?—*A*. I think so.

Q. You have no doubt that Indian youths will be attracted to these professions when the necessary education is offered them?—*A*. I have no doubt about that.

Q. Are many young men going out from Madras to foreign countries to receive technical and scientific education?—*A*. There are some. I know many are going to the Victoria Technical Institute.

Q. Is the prejudice against manual labour dying out among the higher classes?—*A*. I think so.

Q. Are Brahmins willing to do manual work?—*A*. They do at present. But other classes do better.

Q. But the prejudice is dying out?—*A*. Oh, yes. It is dying out.

Q. Dying fast?—*A*. Yes.

Q. You refer to the aid which the Governments of Mysore and Travancore have given to the projected match and paper factories. Can you give us details?—*A*. For the match factory the Government of Travancore gave a concession that they will give all the fuel required and wood at Rs. 5 a ton on the spot. That is a very favourable rate.

Q. And for paper?—*A*. I do not know. I think a private company has taken it up.

Q. Has the private company taken it up with the assurance of Government aid?—*A*. Yes.

Q. You recommend grant of loans on the security of machinery and buildings at a low rate of interest?—*A*. Not so low as to make Government lose.

Q. You say that you are in favour of Government having the accounts of a concern audited?—*A*. To feel certain that the concern is not misusing the money.

Q. That would be a safeguard against the misuse of the money. In order to ensure that the technical side of the business is properly attended to, would not a periodical inspection by some expert be useful?—*A*. That would no doubt be helpful, but he should not interfere with the internal working of the thing.

Q. You do not object to inspection?—*A*. No.

Sir F. H. Stewart.—*Q.* If you limit the control to audit, the audit will come in after the money has been spent?—*A.* In that case the Government will have full security for it. People who invested the money will take care of the business and I do not think that the Government need be afraid of the matter. They will always have a sufficient security with them.

Q. Hon'ble Pandit M. M. Malaviya.—*Q.* You recommend a well equipped laboratory with modern equipments in a central place in India with branches in three or four of the presidency capitals?—*A.* Yes.

Q. You wish that this should be regarded as forming one system, one completed whole and that there should be correlation between the activities of the different provinces?—*A.* Yes.

Q. You say that they should have it as an object to train young men of promise in original investigation to enable them to undertake valuable scientific work?—*A.* Yes. You cannot always depend on the highly paid man from outside.

Q. In that case after receiving their education here our young men could be sent to foreign countries to complete their education?—*A.* Yes.

Q. Would a scheme of proper training in banking be necessary if there is to be an industrial development?—*A.* It would be a necessity.

Q. When was it that you started your hand loom factory?—*A.* About ten years back.

Q. Have you been developing it all through these years?—*A.* No. It has developed of itself.

Q. What do you mean?—*A.* We have come to a certain point beyond which we are not able to go.

Q. Are you expanding the business?—*A.* I did not go in for any business. I simply took the matter up to teach the people and the work I had in view has been done.

Q. It is still largely practised as a home industry?—*A.* Yes.

Q. Is there any arrangement for supplying raw materials to these hand loom weavers and for marketing their products?—*A.* There is one in Conjeeveram. That is the only one that I have heard of.

Q. Do you think that it would be desirable to have co-operative societies to supply yarn to the weavers and also to find markets for their articles?—*A.* I think that it will be very desirable.

Q. Do you think that a commercial museum at the headquarters of every district will be useful?—*A.* I think they will be useful.

Sir F. H. Stewart.—*Q.* In connection with what you have said about the mills, would you send your note in to the Secretary in the form of a confidential note because the President may like to see it?—*A.* I shall send it in the form of a note.*

WITNESS No. 205.

HON'BLE SIR FRANCIS J. E. SPRING, K.C.I.E., *Chairman and Chief Engineer, Port Trust Board, Madras.*

[NOTE.—*Witness did not submit written evidence.*]

ORAL EVIDENCE, 23RD JANUARY 1917.

President.—*Q.* I understand that you are willing to have a talk with us about some of the problems that we have had evidence about in other towns. You have had a long and successful experience of India, and my colleagues would very much value your opinions on some of these questions. One of the questions that we have had before us is the question of technical and scientific aid to industries. Nearly every one of the difficulties that we are up against has been insurmountable for want of proper scientific advice in the country. Governments have been asked to assist in financing industries, or assist in other ways by giving concessions to industrial enterprise, and in each case they have been faced with the difficulty of having an insufficient amount of technical and scientific advice as to the suitability of the industry and the locality where help is wanted. Following that we have had to consider not only the question of enlarging the scientific and technical services in order to provide the right amount and the right kind of specialists, but we have also had to consider the question of the organization of the scientific and technical services. They are, as you know, at present under various forms of organisation. We have, in the case of the Forest Department, an Imperial service, with officers placed under the orders of the Local Government, the general plan of work being under the control or supervision of the Inspector-General of Forests who is the Adviser to the Government of India. Somewhat similar arrangements were adopted for the Agricultural Department and you are familiar with the system of the Public Works Department. In the case of the Geological Survey we have a purely Imperial department, the Director is responsible immediately to the Government of India and the officers under him are under his orders, on whatever problems they may be working. But the Director works in co-operation with Local Governments though the officers are never placed under the orders of the Local Governments. The principle recognised in that case was this, that the Geological Survey is a purely advisory body and has no executive functions of any sort. Certain other departments that are technical in their foundations, like the Public Works Department and the Forest Department, are more than advisory; they are also administrative and executive. It was recognised that when promptness and local knowledge should supersede special knowledge the local Governments should have control of these technical officers. In the Agricultural Department we have a much more interesting system. We have agriculturists who take a general survey of the science and art of agriculture. We have associated with them agricultural chemists, generally one to each province. We have also economic botanists, economic entomologists, mycologists and various other specialists who are devoting their attention to the application of their respective sciences to agriculture. The present arrangement is for these officers to be under the Local Governments with an Agricultural Adviser to the Government of India. They are on an Imperial list but they are actually under the Local Government; and more or less regarded as continuously the officers of the Local Governments. The question arises as to whether in a service of that kind you can provide sufficient scope for the ambitions of, say, the agricultural chemist. He will always be, under the present arrangement, agricultural chemist in a particular province. There is no Chief Agricultural Chemist to the Government of India and thus there is no scope for the ambitious young man to rise beyond the mere recognition of his value in the way of increased pay locally. The same thing applies to the entomologists and the various botanists Besides, we have chemists under the Ordnance Branch of the Army Department, one chemist in the Geological Survey, one chemist under the Mining Engineer of the Railway Board, and other chemists scattered about the country. The result is that whilst we have 40 or 50 chemists in Government service in India there is not a single chemist who is responsible to the Government of India for the collective opinions of all chemists, on the question of chemical policy, or on any problem that requires the association of more than one chemist. Under the present system there is a danger that Local Governments will refer to their agricultural chemist not only problems relating to agricultural chemistry but those relating to dyeing chemistry and various other chemical problems that occur to them Thus all those more or less independent chemists get problems of all varieties put before them. No specialisation is possible, and nothing like a systematic organization that will enable the Government of India to gather the chemists together in one organised group. There is a feeling amongst some of them that they are merely employed as chemists for particular purposes and have no official standing. In any scheme every Local Government naturally likes to have officers of the kind at their disposal. They believe that if these are constituted into Imperial departments, the Local Governments may not get the full attention that they would secure if they had the officers under their orders. Thus there are two sides to the question. The one relates to technical and scientific efficiency; an Imperial organization gets the benefits of specialists, of a centralised library and laboratory, and of collective opinion on a particular subject. The other side is the question of executive application; the Local Government may wish the problem that they refer to be dealt with as urgent, while the Government of India department may consider it to be a small matter. We should like to know what your ideas are with regard to the way in which the scientific and technical services ought to be extended, and generally what form of organization you would prefer for such a new and extended service. I do not know if I have expressed myself sufficiently clearly about these various ideas which have been put before us?—*A*. I do not suppose I have given half an hour's thought to the question of the organization of any such service. But at the same time I think you would be well advised to have a Board, or an advisory body of some kind, with the Government of India to whom in scientific matters reference might be made by Local Governments as advised by their own men. If I understand aright, the membership of the existing Board of Scientific Advice is honorary, and nobody has any right to call upon them for advice.

Q. The Board of Scientific Advice at present is composed of the heads of certain scientific departments and their operations are confined practically to controlling the programmes and research work with a view to prevent overlapping?—*A*. Do they sit and prepare such programmes?

Q. They meet twice a year and consider the previous year's reports and discuss the following year's programme.—*A*. The only way I have come into contact with that Board was when I was present in Calcutta in the Office of the Geological Survey on one occasion when I brought in some of the results of my investigations into the quantity of insoluble matter carried in some of the great Indian rivers. I do not know whether it was anybody's business to carry the matter any further. Certainly it was a matter of enormous geological value.

Q. The members of the Board of Scientific Advice do not in any way represent the total quantity of scientific activity in India. They do not, for instance, represent in any sense the scientific workers of the universities or the independent colleges There is no representative chemist on the Board of Scientific Advice although there is not a single industry in the country that is not almost directly dependent on chemistry. There is no electrical engineer on the Board of Scientific Advice. The members are merely heads of certain Government departments who happen to touch one another so closely that in the old days they used to overlap to some extent in their activities ; their operations have now been so effective and to some extent so satisfactory that their meetings last only a very short time. They have got to understand one another so well that overlapping no longer occurs?—*A*. Ought not an Indian Institute of Science to be established—not necessarily the Indian Institute of Science at Bangalore—as a nucleus of some such body to which reference might be made in all scientific problems?

Q. We are up against the question whether an institute should be composite or devoted to one subject. In the case of the Geological Survey we have one subject or, at any rate, its related branches. We know exactly the boundary line of the Geological Survey. The problems which fall within that boundary line are certain and there are certain problems which fall without that boundary line. The boundary line is so sharp that there is no confusion between the functions of the Geological Survey and the functions of any other department. That means that if a problem falls within the scope of the department it is the duty of the department to solve it and give an authoritative answer which represents the combined geological thought of India. There are certain disadvantages in that water-tight compartment system but some of our witnesses are of opinion that we ought to have a similar organization for chemistry. We should like your views as to how it would work.—*A*. We ought to have a similar organization for chemistry somewhere—not necessarily a Government department such as the Geological Survey, but a place of reference to which all important problems might be referred for special advice.

Q. Of course the Institute at Bangalore has by process of natural evolution become almost a chemical institute?—*A*. To my mind there is some hope that it may become so for all India.

Q. It is devoted to chemistry and has also special classes for electrical engineering and I believe it has shown its real value in that way. The results that have been obtained are known now to be of real economic value to the country?—*A*. Yes.

Q. Do you think that it might be extended so as to cover every other form of science?—*A*. All that I have to say about the Indian Institute of Science at Bangalore, I have already written in the form of an article in Mr. Jevon's Journal of Economics. I hope that institute will be found ready to solve the chemical problems of the future.

Q. You rather hope that it will extend to other subjects than chemistry?—*A*. I hope it will extend to the practical chemistry subjects which underlie most of the economic and industrial problems.

Q. How is physics to be provided for? Ought we to provide anything in this country corresponding to the National Physical Laboratory?—*A*. We certainly ought to · that is, unless the results of the Physical Laboratory of England are always available and applicable to Indian conditions, which they will be in a very great number of cases.

Q. As regards most physical science problems we can get work done in Europe as well as it can be done in India ; but in the case of biological science, especially economic biological science, the evidence so far tendered to the Commission shows that research work should be done in this country?—*A*. I agree. I suppose you include biological problems relating to growth of plants.

Q. Yes. Take for instance a plant that yields a drug. Some of the plants have their best drug-yielding conditions at a particular time of their growth, sometimes in a particular month of the year and sometimes even at a particular hour of the day. Obviously you could not send anybody out to collect drug yielding plants, send them to Europe, and get anything like an authoritative answer as to their value as drug yielders. Research work of that kind must obviously be done in this country?—*A*. Yes.

Q. The same thing applies largely to entomological problems?—*A*. Yes, and for example such entomological diseases as are found on sugar cane, and so on.

Q. Generally I think there is not much dispute as to the conclusion that research work of that kind must be done as nearly as possible under the conditions in which the results of the research are to be applied by the people. In many cases it is wrong even to do research work in the hills, in spite of the larger quantity of work that can be turned out?—*A*. Quite so.

Q. You have not spent any great amount of time in thinking out problems of that kind?—*A*. No.

Q. Can you give us your views as to how education is likely to affect the quality of the worker? For example, at present primary education in the country has extended to a very small degree and it has been suggested that an expansion of primary education would make the worker not only a better workman, but would give him tastes of a kind that would enable him to appreciate the increased pay that he would thereby get. Complaint is frequently made that there is no use increasing the workman's pay as it merely means that he stays away for two or three extra days in the week and spends his time in studying the value of native spirits?—*A*. You cannot generalise about the natives of India any more than of England and America. There are classes of men who will stay away and there are others who will not. But there will be a rise in the scale of comfort if they get opportunities of earning more.

Q. The point is, would an expansion of primary education improve the worker in that way?—*A*. I hold very strong opinions on that subject and have expressed them very fully to Mr. Stone, the Director of Public Instruction. My opinion about primary education for what it is worth is this. Primary education, I take it, means the learning of the elements of reading and writing and figuring in the vernacular. It does not amount to more than that. Is that your definition? Not beyond the vernacular stage?

Q. There is not much hope of going beyond the learning of vernacular for some time?—*A*. Reading, writing and ciphering are only a means to an end. The person who learns to read, write and cipher gets at the thoughts of other people in literature in books, and generally in a library, and is able, by the use of these means, to get at the end—that is knowledge. But as long as you have no literature in the vernacular that is worth anything in the direction of technical or industrial knowledge, I do not know what is the good of your teaching reading, writing and ciphering in the vernacular; and Mr. Stone tells me that he cannot get simple vernacular books published for anything like the price the working people would be able to pay for them.

Q. And there is the difficulty of translating also?—*A*. For many years I have urged on leading Indian gentlemen, who are interested in progress, that they might spend a little of their leisure in translating simple books in elementary science and elementary veterinary work and elementary ideas about crops and should publish them at a price at which a poor man can buy them—probably a penny or two, and certainly not half a crown. You must encourage the publication of simple and cheap literature of a kind which that class of men will probably read with pleasure and profit. In the absence of practically any such literature I see no good in what is called elementary education for the masses—which, in India, practically means for the cultivators.

Q. You don't think that they should learn English?—*A*. You cannot get them to learn English. The number of schoolmasters who could teach them English is negligible.

Q. Do you think it is practicable and advantageous to introduce anything like manual training in the primary schools?—*A*. I take it you are now up against the problem of the dearth of suitable schoolmasters. But I feel very strongly on the subjects of drawing and of manual training.

Q. You think that both are essential?—*A*. Drawing of course is essential, and by the use of the term I desire to convey the following idea. Drawing is a means whereby even if all the machines in the world were destroyed and not one of them were left, but only a set of drawings of them, and if after ten thousand years these drawings were dug out, our successors should be able to repeat the machines. That is what I call drawing. As regards the help afforded to the artizan classes in this matter of drawing by the Engineering College, I may mention that in the case of a young Indian in whom I took a great deal of interest, and to whom I myself gave some months of daily lessons in mechanical drawing, I tried to get some drawing instruction for him in the Madras Civil Engineering College and was unable to do so, because he had not passed the F.A. or Matriculation examination.

Q. We have seen a good case of a purely industrial school with two years' course for sons of carpenters and sons of blacksmiths at Nagpur?—*A*. There was Mr. John Lockwood Kipling's School of Art in Lahore. That school did a good deal of useful work amongst the carpenters' sons who frequented it.

Q. At Nagpur the boys are taught drawing as an essential part of their training—drawing of a kind that you mean, namely, simple plan and elevation. The first thing they are taught is to draw a straight line, which you know is a very difficult thing and then drawing lines at right angles?—*A*. The kind of drawing that I have in my mind is this. Many years ago I used to be an examiner in the Calcutta University for the Engineering degree, and before the examination I used to drive out to Kancharpara where I knew the Locomotive Superintendent of the Railway and used to get him to lend me a few wooden patterns of simple parts of machinery from his pattern loft—as many as there were students competing for the examination I then used to put one of the patterns opposite to each student and to ask him to make, in pencil, within half an hour, a simple set of drawings whereby, if I took away the pattern and gave only the drawings to a carpenter he should be able to make a similar thing. To do *that* is what I call drawing, so far as primary schools are concerned.

Q. That is the kind of drawing that they are being taught in this industrial school at Nagpur, and the boys showed me some excellent drawings that have been made there?—*A*. If any good is to come out of it, such boys must be artisan boys.

Q. They are fourth standard vernaculars boys, sons of carpenters and blacksmiths and they are taught not only to use improved instruments and labour-saving appliances but to draw everything they make and to make everything they do, from drawings?—*A*. That is the clue to the whole matter. You teach your lads to think in three dimensions instead of in two.

Q. That is an experiment on a small scale. But is it possible for one to extend that?—*A*. I don't think you can get beyond one school in a district or perhaps one in a Tahsildar's taluk. I don't suppose you could have more than that because you have not got enough men to teach.

Q. You think we ought to endeavour to get more men to teach?—*A*. Yes.

Q. And this would have a beneficial effect on industrial development?—*A*. I think it would. But there are far bigger obstacles than this to industrial development, so long as the thoughts of "educated" India run on their present lines—talking and writing.

Q. We have got to remove all the obstacles. What other obstacles do you think we ought to tackle?—*A*. The Indian capitalist has a profound disbelief in the ability and in the honesty of his fellows who seek his capital for the promotion of industries. It is not we but the Indians themselves who ought to tackle the problem of lack of mutual confidence which prevents the raising of capital. I don't look upon Messrs. Tata's enterprise as an example of *bona fide* Indian enterprise. It is Parsi enterprise which is a very different thing. They are foreigners like ourselves.

Q. Do you think that something of that will be attained by Government setting an example?—*A*. I was associated in an interesting and close way with Mr. Chatterton's first introduction of the aluminium industry into Madras. For when it had reached a certain stage and it came to a question of Government continuing the aluminium department of the School of Arts as a Government factory or handing it over to private enterprise, the then Governor of Madras, Sir Arthur Havelock, sent for me to advise him on the subject, and my advice was that the enterprise having got so far ought to be handed over to private enterprise. I am not familiar with the vicissitudes of the industry after that interview, but I understand that the Madras Aluminium Company has been successful and has paid very large dividends. I do not know how many Indians are in it, or whether there are any.

Q. That company was floated in the open market?—*A*. So I understand ; the shares have always been quoted in the market quotations. But I am not personally acquainted with the details and think that it cannot truly be described as an Indian industry.

Q. Are there not a certain number of Indian share-holders?—*A*. There may be for all, I know, it is a kind of business which might very well have been taken up and run by Indians. Similarly as regards tea it has never become an Indian industry, though, being agriculture, one would have thought that if Indians had any industrial genius at all, they would long ago have made it their own. I judge, however, that they would probably fail in the technique necessary for the manufacture of the best product, and so would have made a mess of it.

Q. There are Indian jute mills?—*A*. I understand that there is a good deal of Indian money in jute mills, in cotton mills also and in cotton ginning.

Q. How are the big Bimlipatam jute mills run?—*A*. I do not know, nor can I tell you the number of spindles. I think it is quite a small concern, as compared with the Calcutta jute mills. The removal of the obstacle of drawing does not necessarily mean the removal of other obstacles. I do not know whether the Commission knows anything about the lead pencil works at Tuni near Visagapatam. It was only the other day that a certain Indian Member of the Imperial Legislative Council spoke to me about it and said that it was a thing that should not have been started because the conditions were inimical and it could not be run satisfactorily. If the Indian made lead pencil costs a penny, and if its quality is so bad that it will do no more work than a half-penny Austrian pencil, I fail to see where the advantage comes in.

Q. How are the people to get advice on questions of that kind?—*A.* I presume, from your suggested Imperial Board of Scientific Advice.

Q. You want a great variety of technical and scientific men for that purpose, because all these narrow down to very special questions?—*A.* Yes. In the Council of the Institute of Science the idea that we expressed was that we could not possibly have every kind of specialist all the time; but that for a limited period of years, say, five or ten, we ought to try to take up half a dozen promising industries, with the aid of well-paid practical specialists on short engagements, and so to endeavour to get a few factories started by men trained under our specialists.

Q. But is it good for the Institute to have a special colouring for a few years?—*A.* The Bangalore Institute has so far specialised on chemistry and perhaps it had better go on in that way, the formation of manufacturing industries being kept separate or subsidiary.

Q. There is room for chemical research in this country on a scale a dozen times that of the Institute of Bangalore?—*A.* Yes. But I do not pretend to have devoted much thought to this subject.

Q. There is one question that you would be able to answer with some authority for our help, and that is the question of Government purchasing stores in this country. You know the old practice and you remember the Government rules of 1913 encouraging purchases in this country of stores that were previously obtained from the India Office Stores Department?—*A.* Are you referring to the stores, that come out fully made from England or to stores made in this country from English materials?

Q. The Government of India rules encourage the purchase in this country of articles that are made from raw materials in this country; and secondly, of articles that are mainly made of raw materials in the country but consist also of some imported parts and put together in this country. We have had complaints before us that these rules have been neglected, that is to say, that officers still go on indenting for articles that could be very well obtained in this country if they knew where to get them, and they say also that such stores would be got in greater quantities if our officers were more generous in placing orders in this country. The reasons which have been put before us for the failure to extend the use of the rules have been roughly these: that an officer does not always know where to get an article in this country and is not sure that, if he did order it in this country, it would be up to quality, which it would certainly be if ordered through the India Office Stores, because there are specialists in England and there are firms of standing accustomed to making articles of that kind in great numbers. Another reasons is that an officer would not undertake the responsibility of introducing an innovation. His term of office may be for a short while and he may not be able to follow up a local purchase. His successor might come and condemn his work because of the kind of articles used. A remedy has been put before us that we should have in this country a stores purchasing department which really supersedes the India Stores Department; that we should send home indents only for such articles as cannot be obtained in this country; that the Stores Purchasing Department in India should gather together all the requirements in the different departments and should obtain orders large enough to get favourable terms and, by constant repetition of orders, make forward contracts; and that this department should make it its business to have an intelligence branch which would enable it to know where in India the particular articles could be obtained in constant and high quality. It has also been suggested that the stores purchasing department would be able to purchase more cheaply European articles from the local agents of English firms than by sending them through the India Stores Department. I should like to know what your views are on that point?—*A.* I have bestowed some thought on the subject for a great many years past, and I feel that I can talk on it with some authority I might mention first that the agitation for the purchase of English stores, of the class of railway girders and that kind of thing, was at its height somewhere about the year 1890-91, and I helped Messrs. Richardson and Cruddas of Bombay and Messrs. Burn & Co. of Calcutta, in getting permission to quote for railway girders in India of at least the smaller spans. They had previously been trying to get the big spans; but I showed them from statistics that even if they got only the 10-foot spans they would get a very much greater tonnage of steel. As a matter of fact I drafted the letter to the overnment of India which went under the signature of Messrs. Richardson and Cruddas king that they might be given at least the smaller spans. I think the leading engi- ering firms in India will tell you that since then they have had a large share of e State Railway orders for small girder spans made in India. And I do not think y railway engineer would say that this has been in any way an evil. Indeed, I ink the smaller spans have been quite as good made in India as those got out om home. But more than this is wanted. It is not enough in the interest of dia's development that English firms domiciled out here should make up British- ade raw material. I want to see them making up Indian-made raw material, and in nnection with this I have a story to tell. Only the other day I had to place an der for some thousands of tons of steel work for some warehouses I am building. was very anxious, with a view to the general development of India, to get the whole the steel necessary from Messrs. Tata's works at Sakchi. I took a great deal of ouble about the design in order to utilise their sections, and went to Calcutta and ked several firms there for their quotations for the manufactured steel work made Tata's sections. My idea was that it should be better to use Tata's steel, because en if I paid a little more money the money would remain in the country. In due urse my advertisements went out through our London Agents, giving plenty of me for the firms out here to quote, and several of them quoted, but at a price, for ructural work built of Tata's steel, which was not even within 20 or 25 per cent the price at which I could get it, and on a fact, later, did get it, from home. hat was a bad failure. I tried my best to get the whole order placed in India but iled. Eventually I had the whole of my steel-work made by Messrs. Dorman, Long Co., at home.

Q. Supposing orders of that kind were repeated frequently, would not firms in dia be in a position to organize their plants so as to be able to turn out such rticles at favourable prices?—*A.* Certainly they would. I understand from my lks with Messrs. Tata's people that, as soon as things become normal, their intention to manufacture their own structural steel work, instead of merely turning out the ctions. In this way they will be free to develop on their own lines without having consider English-made stocks in hand and so on.

Q. We can hardly expect any firm, whether English or Indian, to meet an order a reasonable price if they get an order only now and then and have no guarantee of ny continuous orders?—*A.* The Calcutta Engieering firms are full up with orders of hat kind all the time. If I could have secured Tata's material made in India of ndian raw material and of Indian labour, I should not have minded paying 5 per ent—but not 20—more than the quotations of the English firms, to keep the order this country.

Hon'ble Sir R. N. Mookerjee.—*Q.* In pre-war time the Tata's could not compete ith Messrs. Dorman Long. Tata's joists were then 5 per cent dearer than those mported from England, and they are now cheaper by 5 to 10 per cent?—*A.* Yes.

Q. The point is what would be the condition after the war when foreign goods ould be allowed to be imported into India?—*A.* That is a fiscal question and I annot say anything about it.

Q. The Tata's can hold their own as regards quality and price?—*A.* In respect f *bona fide* Indian product I am a strong protectionist. I would help Tata by impos- ng import duties not only on enemy steel but on all steel ; and so, when another mergency comes and its resultant isolation we shall not find ourselves as now paying s 1,000 and over per ton, for steel plates all over India.

President.—*Q.* You agree that we ought to do something for the purpose of giving ndustries that are started in this country a fair chance of Government custom, partly ecause the custom is big and thereby becomes important to industry and also partly n order to retain in the country as far as possible the money spent on these articles?— . Government custom is a big business now, simply because of the accident that we re not merely a Government but also are makers of things. We do not merely govern he country but we also undertake work which in more advanced countries would be one municipally and privately. But are we talking of paper and pencils now or of igger things?

Q. Would you distinguish between the two groups. Would you get bigger things rom home and smaller things from this country or what policy would you adopt?— . Take rubber for instance. We get many thousands of rupees worth of rubber for he offices in India but we don't directly buy it in India.

Q. The production of manufactured rubber from raw rubber is rather a com- licated industry?—*A.* Yes ; but all the same, the growing of rubber ought to be one in this country by Indians. Rubber is a different thing from tea. Its produc- ion in the raw form is eminently the kind of industry that an Indian might put apital into and could manage quite well—if only he will "go straight" and not adulterate it. So far as I know there is nothing in its production corresponding to the fermentation and drying of tea which, for successful sale, seems to require European supervision.

Hon'ble Sir R. N. Mookerjee.—*Q.* Cement is another industry?—*A.* I am a very large consumer of cement, and in the last few years have taken every ton of cement which the Madras firm that makes it has been able to turn out up to my sample. I have not refused to buy a single ton unless it was not up to the "British Standard Specification" in all particulars, chemical and mechanical. I have had a contract with them for a good many years which is now in the act of ceasing, but in the meanwhile the price of cement has run up by fully 50 per cent over pre-war prices, and in making my coming contracts I have had to consider whether I ought to get my cement from home or to pay a higher price to these local people. I have settled with them to pay them a reasonably higher rate and still to go on taking all that they can possibly give me, up to the "British Standard Specification". And now I have made a contract for a year ahead, for all the cement that the local firm can give me coming up to specification.

Q. Were the prices favourable before the war as compared with English cement?—*A.* We had made a special pre-war price with them which was slightly less than the English price and sometimes slightly more. But it was a good deal less than the war price and my coming contract is nearer the English war price.

Q. And selling at that price they could declare dividends?—*A.* You must ask Mr. Scott Mackenzie about that: he is the Managing Director of the Madras Cement Works.

Mr. C. E. Low.—*Q.* Are there any Indians who are making cement in the presidency with which you have had anything to do?—*A.* Not that I know of. I had something to do with certain small cement works at one time, that is, before the present modern works were started here, i.e., Messrs. Arbuthnots'. Although the lime they used was quite first rate the resulting cement was often bad and unreliable. However that is all gone and is past history and the present product is up to sample.

Q. Are there any cement concerns belonging to Indians in the Madras Presidency?—*A.* So far as I know, the works I have been referring to, where cement is made to British Standard Specification, belong to Indians. But the cement making is managed by skilled Europeans. You cannot have a small cement works under modern conditions. Reliable cement can only be made with modern plant for which a comparatively heavy capital outlay is essential. Small hole and corner cement kilns relying on a capital outlay, of, say, half a lakh or a lakh can never be relied on to turn out good cement continuously. What I say about Indians concerning themselves with production, whether of cement, of tea or of rubber—all comes to this: that there monied fellow countrymen must have confidence in them or they will never succeed in establishing big industries. The existing lack of confidence is a thing that we Englishmen can do little to help to cure. It is up to the Indians themselves to cure it. This is what I had in mind when in reply to an earlier question I said there were bigger factors than lack of technical training in the problem of Indian industrial development.

Dr. E. Hopkinson.—*Q.* Supposing a stores purchasing department were formed in India, it would entail the constitution of a complete staff of inspecting engineers and possibly a testing laboratory?—*A.* As far as it relates to structural steel, it would, but not for small things like red tape, stationery and sealing wax, which form a very large bulk of the Government purchases. I understand that there is a nucleus of a testing staff under the orders of the Railway Board, at Alipore, Calcutta, and that we can get anything tested there.

Hon'ble Sir R. N. Mookerjee.—*Q.* Everything must go to Alipore to be tested?—*A.* You can get many kinds of testing done in the Engineering College here. Only the other day I bought some two hundred tons of Tata's rails which had been rejected by Government, which means that they do test and reject. But rails not good enough for mail train 60 miles per hour traffic were quite good enough for my 10 miles per hour.

Dr. E. Hopkinson.—*Q.* Such machinery as exists at present might be extended?—*A.* Yes. I think that it might be made quite adequate.

Q. Take another point. Take the case of a pump which must be made at home. Do you think that it is better that that pump should be bought by the Government department in India through the India Office Stores Department from the makers or is it better that it should be bought in India from the representatives of those makers in India?—*A.* I do not think that in India there is as steady a demand for such a thing as that as to make it worth the while of the makers' local agents to keep large and varied stocks in hand.

Q. The advantage is apparently in favour of purchasing at home, because the engineer of the India Stores Department may not be familiar with the local conditions which it is intended to meet; but the representatives of the firms out here are probably in touch with the actual uses of the plant and more familiar with the conditions which the plant is required to fulfil?—*A.* In a general way I am in favour of the system of purchasing certain stock articles of plant from the agents out here of makers in England, provided the home firms are adequately represented in India? I refer to such stock things as the various types of pumps, of boilers, of lathes and so on.

Q. If that became a general system, would it not lead to a much better representation in India of the home firms?—*A.* I think so.

Q. And would it not be very much to the advantage of India?—*A.* Yes. I have known India for nearly half a century and have been watching things develop very steadily, especially in the last 25 or 30 years, and there has been an enormous advance in that respect. Nowadays the makers of several kinds of boilers, and oil engines, of pumps and of smaller things like sewing machines and typewriters, are well represented in India.

Q. But there is still room for a greater extension?—*A.* Yes, of course, and we encourage such extension.

Q. A number of witnesses have stated that they think that Government should undertake a general hydro-electric survey of the possible electric power in India. But that is a very big proposition?—*A.* It is a big proposition for a small country, but not for a big country like India.

Q. Do you think that it is necessary for anything of that kind to be done?—*A.* Yes. Mr. Chatterton can tell you about the Periyar project. I think the investigation ought to be done under the auspices of the Inspector-General of Irrigation or some one of that kind. I think Sir Thomas Holland remembers our conversation in Simla about covering India with borings. That was a suggestion for a similarly big proposition. But it fell through.

President.—*Q.* I asked that this matter should be taken up somewhere about the year 1907-08 and the Public Works Department gathered together all the information that was available in the office regarding water power, but I am not quite sure of anything that has been done since towards what may be called a systematic survey of hydro-electric power?—*A.* I used to discuss the subject of boring machines in Simla with Sir Thomas Holland with a view not only to artesian boring but also for mineral investigation. Electric power investigation would be a similar thing and it would have to be in the hands of some department whose duty it would be to collect the requisite information.

Dr. E. Hopkinson.—*Q.* You say that it would be desirable to institute a survey of the underground waterways of India?—*A.* I have very little doubt about it. I have dug artesian wells in half a dozen places. Only the other day I got a letter from Chittagong where I had suggested an artesian well twenty years ago and they have done it only now and I hear that it is an entire success.

Q. There was a good deal of experimental work done some fifteen or twenty years ago in the way of boring?—*A.* Whatever may have been done in that way in the Madras Presidency Mr. Chatterton knows about it.

Q. To pass to another matter, supposing such an Imperial Scientific Service as the President has sketched out were established, do you think that it should include a cadre of mechanical engineers? Such a service, I presume, would supply men to carry out research in any new industry and to ascertain the prospects of such an industry; and supposing works are established or assisted by Government for any particular purpose, the service would supply the chemist or metallurgist; ought it not also to supply the mechanical engineering knowledge required?—*A.* He must not be merely a working man. He must be something better.

Q. Yes. Is there any difficulty in getting a supply of the right sort of man?—*A.* I think you will get him if you offer sufficiently high salaries. You will not get the right kind of man cheap, though you will get men of a sort.

Q. Could such engineers as you have in mind be drawn from any of the Indian Engineering Colleges?—*A.* They ought to be drawn therefrom.

Q. Can they be drawn?—*A.* Certainly, not at present, though there may of course be exceptional men occasionally. There was an old friend of mine here, now dead whom we in Madras all used to revere very much—I mean the late Sir Bhasyam Ayyangar. His eldest son is now the Deputy Chief Engineer of the Mysore Public Works Department. His father told me that he was at first greatly averse to his son taking up engineering pursuits, but the young man insisted on going through the Engineering College and afterwards through the Perambur Workshops. Here we have a Brahman of good family who is a mechanical engineer to the tips of his fingers

But you cannot get many men of the kind. Most of them want to write and to talk and to sit in office chairs instead of directing the doing of practical work.

Q. You would look for such a man rather to the Engineering Works of the Indian Railways than to the Engineering Colleges at Roorkee or Sibpur?—A. I would like to see the Engineering College men enter the Railway Works, but they do not. They like to get soft appointments and sit at a table and write.

President.—Q. Will the development of the Engineering Colleges produce a larger number of these good men, or must we expect them only through the multiplication of Works?—A. You cannot multiply Works to any great extent in a brief number of years. I think it will be a matter of public opinion amongst the classes from which the young men are derived, and I think the public opinion of this class is now distinctly in process of change in favour of men of that class going into practical work instead of into clerical and law work.

Q. But the change does not seem so far to have affected the recruiting at Sibpur and Roorkee?—A. Largely, because the employer has not got over his distrust of this kind of young man not being thorough enough. Perhaps the new generation is going to be thorough enough. Some few are already as thorough as I want.

Q. Do you not think that distaste to mechanical pursuits is diminishing?—A. Yes.

Q. Do you think that the curriculum at Roorkee and Sibpur requires to be modified to make it more effective?—A. Years ago I had something to do with Sibpur and was for some twenty years on the Board of Visitors. It has been enormously improved to my knowledge. Here in Madras I was on a committee for altering the course for education in the Madras Engineering College, and I think the courses at the College are now all right. But I would like to have a little more drawing and mechanics in the civil engineering course. There are not at present many employers ready to pay for mechanical engineering knowledge.

Q. I do not think that is so in the north of India. There is not much confidence on the part of the European and even of some Indian firms in entrusting mechanical work to the Indian mechanical engineer?—A. Sir Clement Simpson will be able to tell you whether he thinks the Engineering College at Madras is turning out a satisfactory product—at least for the mechanical needs of his mills.

Q. You probably have had men under you who have been students in the College?—A. I have had some, but not many.

Q. Have you ever had in your employ any students who had been sent home by the Government of India?—A. I do not think I have had any of them. I have known men who have gone home and gained knowledge and come back again.

Q. Within your experience have the results been satisfactory?—A. The impression left on my mind was that the men as intelligent human beings had been improved by the experience. That was roughly the impression left on my mind, just as an Englishman would be improved in general intelligence by coming to India for three or four years and going back home again.

Q. Do you consider that the Indian boy has a natural aptitude both for mechanical and free-hand drawing?—A. In the last few weeks, since our cyclonic disaster, there has been in my office nothing but drawing and calculating by Indians. It is quite good enough. I get very good men and very reliable, plodding and industrious people. But the best of them must be guided closely and cannot be left to themselves.

Dr. E. Hopkinson.—Q. Do you think that Indian boys show a natural aptitude for free-hand drawing?—A. I might say "yes" or "no" to that question. When we Englishmen came to India first, we had to make use of drawings and we had to look out for people who could make drawings, and there were none except the tailors or *darzis*, who were in the habit of making flat patterns for embroidery. Nobody could make a three-dimensioned set of drawing. Later Mr. John Lockwood Kipling, Principal, School of Arts at Lahore, started drawing classes for carpenters' sons. For many years I have had one or more of these men about me and they differ from the ordinary *darzi* draughtsman in being able to see and to draw in three dimensions just as we do, instead of in two.

Q. In order to make them see in three dimensions you should make them draw from models?—A. Yes, and model from drawings.

Q. Do you think that if a universal system of primary education existed in India drawing and modelling ought to form an absolutely essential feature?—A. Yes. It is, I consider, an essential part of a useful industrial education. But the difficulty will be to get the teachers.

Q. Looking at it entirely from the industrial point of view, unless primary education took that form you would sooner be without it?—A. That is [illegible]. But I do not believe in teaching people to use a fork and a spoon [illegible] them on.

Q. Your simile is precisely to the point. You would say that to give a hungry man only a fork and spoon makes him worse off than before?—*A.* Yes, and I certainly think that the leading Indians of the country ought to make a push towards trying, in advance, to supply a cheap, useful vernacular literature. If they want to push primary education they must be prepared to produce this cheap kind of literature, or primary education might as well not be given. Reading and writing and figuring are not an *end* but are only *means to an end*—that is, to the utilization of the knowledge that is stored up in books ; and if the books aren't there, what is the good of learning to read?

Q. Do you say that there are no suitable text books in elementary science or other subjects in the vernaculars which are now available?—*A.* I cannot say that myself. But I understand that there is nothing available now worth having. All the same I don't like the term " text-books ". I draw a strong line between text books and books of knowledge.

Hon'ble Sir R. N. Mookerjee.—*Q.* There are books in medical science in Bengali, but there are words which could not be translated?—*A.* That will be one difficulty with the scientific words. I do not know what there is in Madras.

Dr. E. Hopkinson.—*Q.* There is another possible aspect in which increase of educational facilities might affect industrial undertakings. We have seen again and again in the course of our tour how an improvement in the environment of labour, better housing and better food has improved the quality of labour. Supposing the industrial classes were better educated they might be more desirous of and more certain of obtaining better conditions which would be to the advantage of labour?—*A.* You are now talking chiefly, I take it, of factory labour. Sir Clement Simpson will be able to say something on that point. I certainly agree that the more you give a taste for a higher standard of living the more they will want to earn and the better they will be able to pay for the goods that are made in England and in other countries. If the present average earnings per individual throughout India is Rs. 3, I should like to see it rise to Rs. 15 or 20. If you look up the statistics of a port like Durban you will, I think, find that it has double or four times the traffic of Madras Port, though Durban has behind it a population of perhaps not one-tenths of that behind Madras. The reason being that the white man's standard of comfort is higher than that of the Indian and if he sees a thing and likes to have it he will earn enough to get it, whereas the Indian says, mentally, " is it *custom* to have it " ?

Q. Would you go one step further and say that the higher the rate of wages the cheaper is the labour cost of any particular piece of work?—*A.* I cannot improve on what the late Sir Thomas Brassey has said on the value of labour. I can endorse it from my own personal experience. I reckon to get quite as much work out of a gang of 20 Pathans each earning a rupee per day as I can get out of 50 Madras coolies at annas 8 per day.

Hon'ble Pandit M. M. Malaviya.—*Q.* You have noticed the case of a son of the late Sir Bashyam Ayyangar who showed an inclination to go into engineering. Don't you think that if we had technical colleges there would be more inclination on the part of our young men to go into industrial enterprise?—*A.* Who go into our engineering Colleges here? Not those who hope to become successful lawyers but young men who do not see much prospect of succeeding in law. I don't think that those who go in for engineering are held in such repute in their own houses and families as are the lawyers or the men in Government service.

Q. You have yourself observed that there is a change in this direction?—*A.* Distinctly. I meet and talk a good deal when I can with cultured Indian gentlemen and I know that the general feeling is that their boys must do more in the way of industrialism than they have done up to the present.

Q. Less than a century ago, in Germany, the desire for Government service was as keen as it has been in India, but when technical colleges and institutions were provided young men began to take to them. Don't you think that if similar stimulus were given to technical and scientific education here a decided turn would be given to the tendencies of our young men?—*A.* Yes, perhaps if at the same time you make the higher literary education self-supporting.

Q. Is the higher literary education self-supporting in any part of the civilised world?—*A.* The Universities in Europe and America are largely self-supporting because there are big endowments. In India your wealthy man has not got into the American habit of endowing his *Alma Mater*.

Q. But there are also Parliamentary and other State grants to University Colleges?—*A.* Yes, I suppose so.

Q. And the tendency is to recognise that the State ought to contribute more and more to higher education?—*A.* I do not think there are Parliamentary grants for Manchester, Birmingham, Cambridge and Dublin.

President.—The newer Universities in England receive grants for the training of young men who are afterwards going out as second-grade school teachers. The older Universities do not receive any grants at all from Government, but rely entirely on their own endowments.

Hon'ble Pandit M. M: Malaviya.—*Q.* Since the Technical Education Act was passed in England, the Government has been affording more and more assistance for promoting technical education there, and literary education has not been left altogether to find its own support. Here, even though Government supports higher literary education you might also expect Government to do more for promoting technical education?—*A.* I suppose by "Government" you mean the people who are taxed—that is the people whose trustee the Government is?

Q. Exactly, and there is a very general desire among Indians that more should be spent on technical education than is now being done?—*A.* In token of his desire will one of them stand up in the Legislative Council and suggest that 2 lakhs be cut off from the Presidency College grant and be given to the Madras Engineering College?

Q. Why from the Presidency College grants and not from the other expenditure that the Government incurs? Don't you think that the expenditure on the exodus to the hills might be a fit subject for reduction rather than the University?—(Witness was here interrupted by the following remark of the President).

President.—We are not here to discuss the ways and means of obtaining the grants.

Hon'ble Pandit M. M. Malaviya.—*Q.* You agree that if there was more provision for technical and scientific education, whether Government found the money or the public, our young men would take more and more to industrial pursuits?—*A.* You mean more facilities for education? Are there at present more applications for admission into these colleges than they are able to comply with?

Hon'ble Sir R. N. Mookerjee.—*Q.* In Bengal in the mechanical engineering class they could take double the number. The students don't offer themselves for the mechanical engineering class.

Hon'ble Pandit M. M. Malaviya.—*Q.* Is the standard of instruction given in mechanical engineering in Sibpur as high as that given in the Universities in England?—*A.* It is very good in Sibpur.

Q. For mechanical and electrical engineering?—*A.* I understand that it is quite good.

Hon'ble Sir R. N. Mookerjee.—The standard of mechanical engineering there is not quite sufficient and there should be an improvement in the standard of education.

President.—Is it because the standard is not sufficiently high the students do not apply for that course?

Hon'ble Sir R. N. Mookerjee.—It is because they have not got enough guaranteed appointments.

Hon'ble Pandit M. M. Malaviya.—*Q.* You have heard Sir R. N. Mookerjee say that the standard of mechanical engineering teaching provided at Sibpur is not as high as it should be, or is not practical enough, and you perhaps know that at Roorkee the standard of mechanical and electrical engineering has never yet been worked up to the right standard, so that these colleges are at present affording facilities for training civil engineers for roads and buildings, etc., and not mechanical and electrical engineers. If that is so don't you think that the provision of a college for imparting a high standard of education in mechanical and electrical engineering will attract many youths to it?—*A.* Yes, but there are other points.

Q. Practical training?—*A.* More than that; I do not hesitate to say, even if I thereby hurt their feelings, that something is lacking in the soul of the Indian peoples taken in the lump, viz., the intense internal desire for accuracy, such as is implanted in the soul of the men of occidental race. Moreover you have got first to instil into them good faith and confidence in each other, and at present that is lacking.

Q. In answer to one question you said something about its being a national characteristic of Indians not to desire to go in for drawing, etc. Is it not a matter of education more than of inherited qualities? Has not this faculty or aptitude for drawing been cultivated by education in the youths of other countries?—*A.* I do not think so—not beyond two or three generations back.

Q. Are you aware that the Paris exhibition of 1851 gave a great impetus to the teaching of drawing in English schools and that it was not much attended to before that?—*A.* I do not know if that has any practical bearing on the question of English mechanical development.

Q. Do you agree that aptitude for drawing can be improved by education?—*A.* Certainly. It ought to be a part of education.

Q. You think it could be cultivated?—*A.* Yes; and you cannot begin too young.

Q. With regard to the question of efficiency growing with wages, would not education also improve the efficiency of workmen—I mean elementary education which would enable them to read, to cast accounts, and do a little drawing and so on?—*A.* But you should have some books if the men are to make any use of such instruction.

Q. I mean the kind of elementary instruction that is at present given in England?—*A.* Every English boy has something to read. There is always something to read in every cottage.

Q. And so also an Indian boy has always something to read?—*A.* Not so far as I know at least not anything of any real practical use to him in every day life.

Q. Where they are literate, they read religious books in almost every presidency?—*A.* Yes, perhaps. But I was not thinking of religion and ceremonial.

Q. So that if elementary education of the right kind is imparted it will promote the mechanical labourer's efficiency?—*A.* Yes. But I don't say necessarily the ploughman's efficiency, unless he learns to read and to understand books about farming, and can buy such books as now are not obtainable by him. I do not think that mere learning to read and to write is of very much use to men working on the fields unless you give them something useful to read. I quite agree and indeed have already insisted that a little drawing might be of great use to the men working in factories.

Q. I was confining my remarks to labourers working in mills and factories?—*A.* Very well. I think it would.

Q. With regard to the difficulty of books you are not aware of what text books have already been published in the vernaculars?—*A.* I object strongly to the term "text-books" if applied to the cheap literature of which I recognize so strong a need. When I spoke of little cheap books I did not mean books to enable boys to work for an examination. I meant books which will impart to the man who reads them a knowledge that will be useful to him in life, and not necessarily with a view to an examination.

Q. I am speaking of text-books of a practical character which would impart practical knowledge in any kind of industry?—*A.* The word "text-books" has acquired a narrow meaning; it has come to mean something connected with examinations. You must have a quantity of very cheap vernacular books on subjects useful to the reader in his evey-day life and not merely for examination purposes. That is, he will want to read them at the age of 50 or 60 and not only at the ages of 16 to 20; but I am told that it is impossible to make them cheap.

Q. I do not know of any reason why it should be so?—*A.* It is for you Indian gentleman to show the way.

Q. Once a text-book is written it would be printed as any other book and with Government support. I do not see why useful industrial text-books should not be made as cheap as possible?—*A.* Very well. But why Government support? The reader of the proposed book has left his school days long behind him. And why "text".

Q. Has the distaste for going into pursuits involving manual labour been disappearing amongst educated men within your experience?—*A.* To a slight extent. I do not say they are swarming into them.

Q. But the prejudice is dying out?—*A.* I do not know whether I am sure on this point. Their guardians and fathers would doubtless like them to go to the factories and earn something. But something might be done to make them attend at the right time when the bell rings, and things of that kind. No industrial country can maintain a position in competition, if its better class of factory men—men responsible for the work of the actual workmen—are sloppy about hours of business.

Q. Would not that be a matter of training and discipline?—*A.* A great deal of that kind of training must be done at home.

Q. At home and at school?—*A.* At home chiefly.

Q. Do you not think that if more careers are open for industrial pursuits this prejudice will die out much sooner and our young men will begin to take up industrial pursuits? If they had the necessary technical training or commercial education is it not likely that they would take to it as rapidly as they do to law?—*A.* Law does not require capital. Law does not require that their friends should put their capital into it. A young man need have no money and yet, with a ready wit and a ready tongue and brain, he deservedly succeeds in law. In industrial work people must believe in the man sufficiently to put their money into his hands and to feel that he is not likely to lose it. At present, owing to causes which perhaps will disappear with time but have not disappeared, there is no such confidence.

Q. Everybody does not succeed at the bar. Success comes to only a few men who rise to the top, a great many men remain at the bottom, and don't know success. If there was a wide system of technical and commercial education it is likely that more young men will go into these directions than they do at present?—*A.* What you are trying to get out from me is, I take it, that if Government change their policy and give larger sums of money for mechanical engineering training and to engineering colleges, than they do at present—you don't say give less for higher education, but you want the same grant as at present for higher education—will not more young men go in for this mechanical training? I do not think that is the way of turning the thoughts of the rising generation to mechanical problems. I do not think that the multiplication of colleges is the way to turn their thoughts to industrialism. I think it is the public opinion of their friends, and at present such opinion practically does not exist.

Q. That alone will not be sufficient to turn the tide ; but in addition there is a desire to start industries, and would not the two taken together give a decided turn?—*A*. To my mind the desire to start industries translates itself into a desire to put your capital into commercial companies. Is there any exhibition of any such desire at present?

Q. From the notes I have read of the evidence submitted here, I find in some of the districts there is a keen desire to invest money in industries. They complain of want of technical and scientific advice. Taking this growing desire for investing in industries with greater facilities for scientific and a technical education, would you expect the youths of this presidency to take more and more to industrial careers?—*A*. I should like to see an industrial school fit to teach the general principles underlying industrialism established in every district. I do not think you are anywhere near the point of establishing them in every village yet.

Q. And you would have at the capital of the presidency a larger institution?—*A*. Yes, as we shall soon have at Guindy.

Q. With better equipment for teaching mechanical and electrical engineering than at present?—*A*. I think Mr. Chatterton was a prominent member of the Ootacamund Industrial Conference a few years ago, and there was a good deal of talk on those lines of taluk school workshops and district school workshops, working up towards the highest mechanical engineering college in the presidency town.

Q. But action has not been taken on the report of the Committee, I understand?—*A*. No.

Mr. A. Chatterton.—*Q*. As a general principle would you agree that, for the development of a spirit of industrialism here, it is necessary that the establishment of industries should precede the supply of technical education?—*A*. You are asking me, is it necessary for the development of an industrial spirit that industries should precede an attempt to supply technical education to the people? There is no chance of making an industry a success unless the men who are employed and have power to guide it know something about its underlying principle.

Q. If we start technical colleges and schools, are we not running a risk of turning out a large number of men who afterwards would not be able to get any employment?—*A*. I think Government might do a good deal to cure this defect. Government consistently, habitually and systematically make the appointments of the subordinate district officers from the literary class. I say that a man will be no worse a tahsildar or a munsif if he has passed through an Engineering College, or through the mechanical engineering class—probably he would be a very much better munsif. A man who has been taught scientific survey and the principles of the flow of water will be at least as good a tahsildar—other things being equal—as a man who has got a law or a history degree.

Mr. C. E. Low.—*Q*. Which would get the failures—the commercial world or the Government?—*A*. Even if it were known that Government would receive applications for munsifships and tahsildarships from men who have been trained in technical colleges they would not necessarily, I think, get the best men out of those colleges.

Mr. A. Chatterton.—*Q*. You would extend technical and industrial education and find outlets for the surplus men not absorbed by industries in Government service, employing men so educated as an alternative to men with literary education?—*A*. Certainly, and if I were Government, I would make a beginning by not any longer letting it be believed that a training in an Engineering College was a disqualification for employment in the Revenue Service.

Q. Do you think there is any need in India, in connection with the civil engineering and mechanical engineering professions, for the establishment of an Indian Institution of Civil Engineering and Mechanical Engineering so as to create the same sort of professional tone that there is in a country like Great Britain?—*A*. I know a little about this. When I was a Member of the Council of the Institution of Civil Engineers London they wrote to me to say that they had seen a circular from an Indian gentleman in Calcutta desiring to establish an "Institution of Civil Engineers" for India. Naturally the world's parent institution objected to its title being plagiarised. After some correspondence I pursuaded the Indians concerned to consent to have the proposed title changed to "The Indian Society of Civil Engineers" and I got them two or three members, and I think they published one or two numbers of their periodical, but now it has disappeared—its fate a type, I fear, of much *Swadeshi* enterprise.

Q. You are acquainted with the system of engineering education out here, in which we have four engineering colleges and each of these colleges consists of several departments one for men who will ultimately become officers and the rest for various grades of subordinates. Dealing first of all with the class for officers, would it be advisable or practicable to have a single engineering college of a high grade for the whole of India, admitting only students who will ultimately become officers in the Public Works Department or elsewhere?—*A.* I think a young Indian gentleman from Tanjore would find himself a complete foreigner at Roorkee.

Q. Would he find himself worse off in going to Roorkee or Poona than if he went to England?—*A.* No ; But he gets other advantages in going to England.

Q. In Bangalore, for instance, wet get students from all parts of India and they don't seem to be out of it. Different classes of students mess together and they have got what requirements they want to keep up their caste system?—*A.* The idea has really never passed through my mind. I am inclined to think that it may be a good idea, if the objection I have suggested is not an insuperable objection.

Q. At present, except Roorkee, all the other engineering colleges are directly associated with the universities, and the students work in the engineering colleges with a view to get diplomas or degrees from the universities. If we adopt some system of the kind I have suggested, it would then be possible to cut off the engineering colleges altogether from the university. Do you think that it would be an advantage?—*A.* I think that the Indian father of a family attaches a very high social value to University degrees and not to Roorkee or other college certificates. Still I have never liked the system of universities giving degrees for work done at colleges to students examined by outside examiners who are not themselves skilled teachers or examiners.

Q. There is said to be a growing desire, on the part of young men of good parentage and a certain amount of social position, to go into industrial work. Under the present circumstances they first of all go through the university course and they are about 20 or 21 when they finish it. Would it be good for boys who wish to embark on an industrial career to begin at a much earlier stage?—*A.* Would you not make the two courses parallel?

Q. Yes?—*A.* I would not cut off the ordinary literary course, but you might cut it down to a certain extent.

Q. If you take boys up to the Matriculation stage they would then be from 16 to 18 years old and would have a fair knowledge of English. In the college they might be given further instruction in English and mathematics. If this were done do you not think we should be able to turn out a much better product?—*A.* Yes. I think we must go on teaching them English while we are imparting technical education. I am referring of course to the professional classes, not to artizans.

Q. May we turn to another point. We have been asked to recommend the establishment of industrial classes all over the country with a view to create a spirit of indusrtialism and to provide the preliminary training which is necessary for young men who want to embark on industrial careers. There are no practical suggestions in this mass of evidence to show what the industrial education should be like. However, assuming that these schools could be started, do you think they will achieve their objective?—*A.* I think that we would be unwise, in making our forecasts, to ignore the very strong influence that does exist in India, that is the caste influence. That influence will, I think, prevent such colleges from being availed of largely by the type of men who in other countries might aspire to industrial leadership. I think we ought to try and get hold of the artizans' sons by scholarships and to educate them and out of this class to get industrial leaders. I think if you hope to turn the thoughts of the people into industrial lines by the starting of a number of industrial schools you are only putting the cart before the horse.

Hon'ble Pandit M. M. Malaviya.—*Q.* With regard to the last answer about the effect of industrial classes, have you studied the system of education which has been prevalent in Japan during the last 30 years for promoting industrial and technical pursuits?—*A.* I have not given much attention to it.

Q. Have you ever looked into system of technical and industrial education which has obtained in Germany for the last 30 or 40 years?—*A.* Yes, a little.

Q. Have they not got a large system of industrial schools and higher technical schools of the grade of Roorkee College for training supervisors and managers?—*A.* Yes. But the country is full of industries. Here there are no industries and if you hope to start industries by first sending your young men into colleges, it is the wrong way of going about it.

Q. Have not industries and education gone on *pari passu* in Japan and Germany?—*A.* You must of course have both.

Q. In the case of these countries they started with providing for technical education and then they started industries?—*A.* I don't suppose the Japanese young man had any initial distaste for using his hands.

Q. Nor can we say that the Indian young man has it altogether?—*A.* He certainly as a class has that distaste—at least in the upper or so-called "educated" classes.

Q. That is a matter for education. Is it not largely?—*A* It is rather a matter of growth of opinion in the homes.

Q. But opinion, as you have said in an earlier statement, has been changing?—*A.* Yes. But very slowly.

Q. You find high caste Hindus taking to tannery work in Calcutta, and here in Madras they are taking to manual work cheerfully enough?—*A.* Yes.

Q. In Japan they began with a system of technical education and they promoted industries also, and so it is not necessary that we should wait to impart technical education until industries develop?—*A.* No. But what is meanwhile going to happen to the young men?

Q. What happens to the young men whom you turn out from Law Colleges and Universities, if they don't find Government service and don't succeed at the Bar? If a man has received training as an engineer he will be much more accurate and precise in dealing with facts than he would otherwise be, and there would not be any harm done if there was an extra supply of such men created?—*A.* It may be so; but I think all the same that you are going the wrong way about it.

Q. I take it then that you would not postpone one to the other. You would start both. You would provide facilities for technical education and also promote industries so far as you can?—*A.* Were I a patriotic Indian I would try to promote industries even if the Government of their own accord would not promote them. Have any Indians followed Sir Frederick Nicholson's lead in the fishery industry, the soap industry, etc.?

Q. Several industries are growing. Take the soap industry in Calcutta it has a great deal of Indian capital. In Bombay and Cawnpore in the cotton industry numerous mills have been started. Other industries are growing and you want a supply of trained young men who will do the necessary engineering work for them?—*A.* Take glass work. The Madras glass works have turned out to be a fiasco. I think they began with making soda water bottles instead of making small panes of glass and other things that the people want. Such things that, as a fact, used to come in large quantities from Austria and now come from Japan.

Q. Was not that due to a mistake of method?—*A.* Mistake of principle. You should first get to know what the demand is likely to be and should then try to supply it.

Q. If you had more Indians trained as glass experts they would be able to know what articles would be most popular with the people?—*A.* I don't know whether you can train a glass expert in a college.

Q. They do so in other countries?—*A.* You want a business man to know what the country wants.

Q. And if you gave the Indians the necessary business training they would know better what the country wants than outsiders?—*A.* They would. But you ought to get them on such lines as these and not merely by getting them to pass examinations.

WITNESS No. 206.

MR. KOPALLE HANUMANTA RAO, *Headmaster, Andhra Jatheeya Kalasala, Masulipatam.*

WRITTEN EVIDENCE.

I write from knowledge of the conditions of industrial enterprise in the Kistna and the two adjoining districts Gōdāvari and Guntūr. Speaking with reference to the people of these districts it may be asserted with confidence of application to future developments that there will never be any lack of capital for enterprises with assurance of success in them. The existence of wealth is proved by the rapidly rising land and rental values: the spirit of industrial enterprise by the rice and ginning and baling mill industry and the numerous pumping installations in and about Kollair and scattered in other favourable spots. Most of these enterprises are one-man concerns or are owned and managed by a small coterie of friends. Ginning and baling factories are the oldest, having been started in imitation of those first built by a few European trading companies. These are situated mostly in and about Guntūr.

Rice mills have followed. A few successful examples led to imitation and multiplication. The first to be started were copies of the large Rangoon mills. The second type was the small oil engine and huller scheme. Recently there has been a reversion to the large mill but built with an eye to higher efficiency and economy of working expense.

There is already a glut of rice mills. But the spirit of enterprise and consciousness of large credit in the market coupled with the stimulus of [illegible] and sense of rivalry is driving the individual capitalist still further into an [illegible] where if there be not prospect of large profits there is not the obvious [illegible] of speculation. During the current year in the Kistna district alone in spite of the high prices ruling in the market for machinery and hardware, there are as many as six large mills under construction of which total cost will go beyond 5 lakhs.

Of large industrial undertakings there are only two jute mills, both joint-stock limited companies with a fairly large number of share-holders in each, but unfortunately dominated by single large share-holders who acquired at the start the sole-managing right of a director or secretary. The measure of control reserved by these over the affairs of the company has obscured from public sight the essentially democratic nature of these organisations and consequently even the slight success that has attended them as business concerns has failed to act as a stimulus to further work in this direction.

The shares in these two joint stock concerns are mostly ordinary middle class men, of all castes and professions, lawyers, Government servants small land owners, who bought shares as an investment for their savings.

The sharers in the rice mills, and ginning and other factories of a decade and more ago, were, where they were not single man concerns, a group of friends from the merchant or Vaisya class. These men were primarily traders and constrained by the necessities of export trade, and stimulated by the example of European firms with factories, started these small enterprises.

In the most recent instances of industrial activity, the latest rice mills and pumping installations, it is the *agriculturist and land owner,* who, singly or in small groups is taking up those industries which primarily help agriculture or prepare his produce for the market.

But in no case has the man of large fluid wealth, or of practically unlimited credit, like the zamindar, so far involved himself in an industrial enterprise.

Pioneer and demonstration factories.

Now, as in the near future, the principal source of capital in these districts would be the middle class merchant, agriculturist or private man of means. To awaken enterprise and to induce capital to flow to an industrial concern it is only necessary to demonstrate a successful business concern. Hence the need for Government *pioneer factories*. To explain by a few examples: A large cotton seed oil mill with adequate accessory plant for the refining or further utilisation of the oil, started and worked by Government in sight of the men of these districts would be readily bought up by a joint stock company formed for the purpose if its success as a business concern be satisfactorily established. Similarly a cocoanut oil factory, with accessory coir works, would find a ready sale, if located in the Amalapur taluk of the Gōdāvari district. So again cement manufacture if started on the bank of the Kistna where good clay and lime-stone abound, is certain to prove a successful industry and will not only find a purchaser but also lead to successful imitation.

The same remark would hold true of a sugar factory about Samalkot. All the above, and more may be suggested, would form fit objects for pioneering work by Government and will stimulate the starting of new joint stock companies for their purchase. Government must be prepared to give them away as soon as a private company can be floated with adequate funds to take them off the hands of Government..

Demonstration factories would similarly serve a very useful purpose in stimulating and advancing manufacturing activity in certain industries. A small chrome-tanning factory would prove a valuable object lesson to leather tanners in every important town. So perhaps a small cane-crushing plant in a cane growing area.

As to the various other methods of aid enumerated in question No. 5 it would be difficult to give definite answers. Conditions may be found where any one of these may prove the most successful method of encouraging an industry. But these will perhaps be most in demand where a small industry directly helps the agriculturist in raising a crop or in marketing his produce. But this kind of help, while it must of necessity lead to elaborate Government control and supervision, must be assigned a place far below that of pioneer and demonstration factories.

Technical aid.

Only next in importance to the starting of pioneering factories is the necessity for giving expert advice and assistance to private industrial enterprises. The Department of Industries, as it is at present organised and manned, is not equal to giving the needed assistance. In the recent past many enterprises have failed because of the lack of such assistance. I may cite the following:—

Two power drills were purchased by private individuals in the Kistna district, one through the Department of Industry. In both cases bore-holes were carried down to depths of 200 to 350 feet, at which stage the assistance of the department officers was called in. But no further progress was made. Both the efforts were fruitless because the alluvial strata at the mouth of the Kistna river had not been bored through; and the constant rising of sand into the bore-hole proved a complication with which the available talent, private and official, could not successfully grapple. Another boring operation in Nellore, which was from the beginning in the hands of the department proved no greater success. It was abandoned at a depth of 250 feet as mechanically too difficult beyond that point. There is evident need of men who have experience of boring operations on a larger scale.

A soap factory at Masulipatam started by an enterprising young man, proved a total failure for similar lack of expert advice and assistance. A plant was put down to work the material by the boiling system. And everything went well so far as the mechanical process of cake-making was concerned. But it was found that the soap was not as good as it should be as very soon after manufacture it developed an incrustation of salt. But over and above this defect in quality, an appraisement of the quantities of raw material used at the outset and of reduced soap that was taken out, showed that not all the soap that ought to have been obtained was forthcoming from the boiling pans, a discovery which rendered all further work impossible. At both points the venture was a failure for lack of the experienced man who could advise.

Similarly the Anakapalli (Gōdāvari district) pencil factory turned out a failure, for the primary reason, among other minor ones, that the right composition of graphite and clay mixture in regard to strength, quality and coherence could not be determined by the available experts. Latterly the whole plant was handed over to Government and two years of experimenting have not brought out a sufficiently good and cheap pencil for the market.

Exactly similar problems, primarily technical in character, are perplexing the manufacturers of glass and matches in the country. So that it may be taken as a clear fact that various experts, men conversant with working methods rather than those imbued with high technical knowledge, in sufficient numbers to be available for use in such factories as may be started, would contribute to the success of various industrial concerns. The type of man that is needed is one picked out of factories in European countries straight from the heart of manufacturing experience with just enough intellectual power to grasp a new situation in materials and men. These would not probably prove very costly and could be had in adequate numbers. The services of these should be freely placed at the disposal of all industrial concerns, of course only for the purpose of advice and short terms of demonstration work. Only nominal charges should be made; for otherwise their services would never be availed of.

Assistance in marketing products.

All museums and exhibitions are of high value as educative agencies. So, whatever the measure of their use as helping to market goods, they must be encouraged and held as frequently as possible, if only to awaken and concentrate popular interest on the advantages of industrial enterprise.

Technical and industrial education.

The question of the relation of technical education to industrial enterprise is one of the obscure passages of Indian public policy and must be definitely solved before general popular effort can be intelligently co-ordinated with real national progress. The idea that the primary function of technical schools is to train and supply the requisite skilled labour for existing industrial ventures, i.e., for weaving and spinning mills, ginning and baling factories, boring and pumping installations, and rice and flour mills, etc., has so far entirely governed the scheme and organisation of industrial education in the country. So that the few institutions that have been started and worked by Government or by private bodies, such as the Corporation of Bombay or the Pachayappa charities of Madras, have been worked under the clear limitation of the need of feeding existing industries. Thus the product of these institutions has thus necessarily been brought into comparison with the regular apprentice from these industries and not rarely has been found to suffer by contrast. Such a view of the need of industrial education for a people would not be fair even in a land of highly developed industrial organisation like England and is utterly inapplicable to the Indian people whose industrial talent has not yet learnt to respond to the conditions of the new industrial activity and organisation in the world. Here there can be no tarrying beside the question of a comparison as to efficiency between apprenticeship and school education but the whole power of the educational ideal must be directed to awaken in the popular mind an inclination and a passion for industrial enterprise which being primarily a human problem, a solution can be found only in and through a widespread organisation of technical education among the people. And this attempt to popularise technical education among Indians may be achieved in two distinct but allied schemes of effort. First, by regular technical schools which directly train boys for the theory and practice of mechanical engineering and, secondly, by introducing into the scheme of general education in the country a course of manual training such as would help to give early enough in life a bias towards work involving skill and efficiency of muscular power. For the carrying out of the latter idea it is evident that the department of general education should revise the existing curricula of education so as most effectively to develop a new bias and enthusiasm for manual work, consistently with the ends of general education. But the other important reform of multiplying and popularising the specific type of purely engineering schools too would be most effectively done only by the Department of Education. For otherwise the Indian youth would instinctively turn away from training which holds out, not the ideal of culture, but of a purely professional training. In this view the organisation of a scheme of technical schools all over the land would furnish the most powerful and effective stimulus to industrial enterprise in the country. And this should be pushed forward with an essentially educational and in view, viz., the creation of numbers of trained young men whose minds have been stirred by the prospect of engineering enterprise in a land of vast possibilities.

As to the controlling authority over industrial schools it should be, in the best interests of such education, the Director of Genera' Education aided perhaps by a Board of Scientific and Industrial Experts. The necessary teaching and training staff in the usual course of progress would come of itself into existence.

ORAL EVIDENCE, 23RD JANUARY 1917.

Hon'ble Sir Fazulbhoy Currimbhoy—*Q*. You say in your first paragraph "Most of these enterprises are one-man concerns, or are owned and managed by a small coterie of friends." Are they European or Indian concerns?—*A*. Mostly Indian.

Q. They are not joint-stock companies?—*A*. No.

Q. I suppose if they start joint stock companies people may not take the shares, and therefore they may have trouble that way?—*A*. There are certain instances of joint-stock companies in those districts. There are two important jute mills, one in Ellore and one in Guntūr. Both are joint-stock companies. Each is dominated by single large shareholders. The result is that people do not understand such undemocratic conditions. A lack of education in the science of the principles of joint-stock companies stands in the way of joint-stock companies being floated.

Q. Supposing some people wanted to do business on their own account. They may do it as joint-stock companies?—*A*. There is nothing wrong in that. A single-man concern cannot be a very large undertaking. No single man can start a jute mill in my part of the country. If these mills are to be large concerns, they must necessarily be started as joint-stock companies. There would be forthcoming an abundance of capital if people could be assured of an element of success in the concern.

Q. Can you show an instance of a big joint-stock company here carrying on a big business?—*A*. I cited you the instance of the jute mill in Ellore, which is purely managed by Indians. It was built by Indians and managed by Indians.

Q. Are they working very successfully?—*A*. Yes. Recent years have given them large profits. There is not sufficient capital floated in the concern. During the last seven or eight years they have been enabled to clear off their debt, and this year declared a dividend of 6 per cent. That is because they had to pay off arrears of the debt and interest.

Q. In what way do you want to improve the Department of Industries; you say, "the Department of Industries, as it is at present organised and manned, is not equal to giving the needed assistance"?—*A*. I think there ought to be more experts. I don't mean bookish men with a knowledge of theory, but men who have had a hand in the practical working of things, who can assist other concerns. For instance in the school that I am interested in, in the matter of workshop work a man who would tell us the right mixture for good cast-iron; who would tell us how to temper steel, etc.

Q. You say, "The services of these should be freely placed at the disposal of all industrial concerns, of course only for the purpose of advice and short terms of demonstration work. Only nominal charges should be made, for otherwise their services would never be availed of." Do you mean temporary advice?—*A*. Yes.

Q. But if the expert is employed for six or twelve months, then the company should pay?—*A*. Yes, the company would be prepared to pay.

Q. In regard to technical education, you suggest two schemes by which the attempt to popularise technical education among Indians may be achieved, and you want the scheme of general education to be carried out by the Department of General Education; why?—*A*. For this reason, because I believe in this country if any education is to progress it must be based on culture. People must be told that they are being trained for culture.

Q. And about technical education, will these other experts manage technical education?—*A*. I am referring to education in the earlier stages of life, when the inclination is first given to tastes and tendencies.

Q. I am just going to explain. If technical education is given, don't you think that it should be under the Director of Industries, because the literary education is under the Director of General Education? You would want more funds for this?—*A*. I am not sure that the line is so sharply drawn between general and technical education.

Q. There would be dual control between a technically educated man and a literary educated man?—*A*. The Director of General Education may be in charge also of technical education. I am not referring to the work aspect of the matter; I am not referring to mills. Just as chemistry is a branch of general education, so mechanical engineering is a branch of general education.

Q. All the technical schools must be in his charge?—*A.* I want that mechanical engineering and everything should be in the hands of one man, one controller.

Sir F. H. Stewart.—Q. You are headmaster of an institution at Masulipatam?—*A.* Yes.

Q. What sort of an institution is that ; is it private?—*A.* Private, though very recently Government has been giving it grants. It was started as a private enterprise to illustrate what we thought was necessary in the present industrial conditions. It is a school in which general education is intertwined with technical education. We are trying to abolish the distinction between the two. A man may be educated as much through engineering as through agriculture.

Q. From what age do you take your pupils?—*A.* From the age of 10 up to 20.

Q. How many have you?—*A.* 200.

Q. You say that in the districts you know best " there will never be any lack of capital for enterprise "?—*A.* Yes.

Q. Have you any personal connection yourself with any industrial enterprises?—*A.* If a few pumping installations can be called so, I am interested, as I have put money in them.

Q. Are you interested in these jute mills you speak of?—*A.* Not as a shareholder but as one who takes a keen interest in things industrial.

Q. You say, " dominated by single large shareholders ". I presume those shareholders started them?—*A.* I am only referring to the human side of the problem. It seems to me a joint-stock company, if successful, ought to stimulate more activity and put more confidence into the people that it will be a success. As it is, the shareholder does not know his own share of authority over the concern. If he could know it, if every shareholder felt that he was in himself a master of the undertaking, he would take more interest in it, and the directors would check the action of the management. Our shareholders do not evince that degree of interest which is necessary for the development of joint-stock companies. It is merely a lack of education.

Q. Do you think that would cause progress in efficiency if every shareholder had a hand in the management of a concern?—*A.* I am speaking in general terms. A man should know that his interests are there ; that he is himself an owner of the mill.

Q. From the educational point of view?—*A.* Yes, if every shareholder felt like the it would be possible to obtain crores of rupees for capital in the district.

Q. You detail the classes from whom capital has been drawn you say it has not been from the zamindars?—*A.* No.

Q. Are they numerous in the district and well-to-do?—*A.* Yes.

Q. What do they do with their money?—*A.* Spend it away in Madras.

Q. Then you go on to mention several pioneer industries which you think might be started by Government, among which you mention cement factories. Is there no successful cement factory in Madras?—*A.* There is.

Q. Is there any need then for Government to pioneer such an industry?—*A.* There are favourable conditions in Bezwada for cement manufacture. There is an enormous demand for cement in our districts, and I am aware of friends who have had this on their minds, but have not ventured on account of lack of expert assistance.

Q. Yet you think that there is a need and that the case might be met by putting Government advice and assistance at their disposal?—*A.* In the matter of cement that might do.

Q. With regard to the soap factory, what has happened to that?—*A.* It is out of existence. The soap manufacturing plant was lent to Government about a year and a half ago.

Q. What has happened?—*A.* I have no idea. We have addressed the Director of Industries on a number of occasions, but have had no reply.

Q. In the next paragraph you speak of the qualifications you want from a foreman or supervisor.. You say you need " one picked out of factories in European countries straight from the heart of manufacturing experience with just enough intellectual power to grasp a new situation in materials and men." That is rather a tall proposition. Do you expect to find those qualities in a man who is not much more than a foreman?—*A.* I have no idea of what kind of stuff the foreman from England is made I did not know that there would be a contradiction between the capacity for work and the intimate knowledge of details, and the intellectual power that is necessary to understand a new situation. I thought there was no contradiction between the two.

Q. You have not come across such men?—*A.* My experience of European engineers is very limited. So far, I have not met mechanical engineers from Europe.

Q. In the next paragraph do you refer to certain charities in Madras?—*A.* I mean a few technical and industrial schools in Madras.

Q. What sort of schools do they maintain?—*A*. There is an industrial school in Madras with a small workshop attached to the school, where they train foreman, mistries, etc.

Q. Is that what you are trying to do?—*A*. That is partly what we are trying to do, but we are trying to do a little more. The point is this; in the institution here there is no requisition that the boy should have any standard of general education. It is not demanded of him that he should have any high standard of general education. There have been Directors of Industries here who asserted that it was not necessary to go beyond the stage of primary education to make good mechanics. Our institution works on a slightly different principle. We believe that a certain standard of general education is essential for every good workman. We want to put some self-respect in our workmen. Manual work will not succeed in this country until the worker knows and feels some respect for himself and his work. Unfortunately in this land manual work has been discounted and put down as work which only low class people take to I am trying to re-bridge that gulf.

Q. What class of workmen are you trying to turn out, the labourer or the supervisor, or the man whom you might call the leader?—*A*. We are trying to develop the workman. By workman I do not mean that he should not become a supervisor. We begin with practical work. We make a man thoroughly efficient, in practical work, and leave it to his own innate capacity to develop into a supervisor or leader, whatever it is.

Q. Have you got a workshop?—*A*. Yes, we have workshops of our own.

Q. Sir Fazulbhoy was asking you your ideas as to the control of this work, and you said your idea is to leave all the control under the Department of Education. Do you maintain that opinion still?—*A*. I do. I think no sharp line of demarcation ought to be drawn between the manual worker and the intellectual worker. The age demands that the workman shall be respected throughout the country as much as the lawyer practising at the Bar. That is why I want to lump all these things under education irrespective of mechanical skill or intellectual capacity.

Q. And you think that the Department of Education is the best department to be in charge?—*A*. Yes, it will be under one head, no differences should be made between worker and learner. All should be classed as learners.

Hon'ble Pandit M. M. Malaviya.—*Q*. When were these jute mills started?—*A*. I think about ten years ago.

Q. Both of them?—*A*. They were started together, but a little internal trouble handicapped one of them. The second was brought into working order only two years ago. The first one has been working these ten years.

Q. What do they make, gunny bags?—*A*. Yes, out of Bimlipatam jute.

Q. How does that jute compare with Bengal jute?—*A*. I think it compares well enough; it finds a good sale.

Q. Is the product of the mill absorbed locally?—*A*. Yes, and it is very much less than necessary for local needs. We are a great exporting district; we export paddy in particular.

Q. What is it that stands in the way of your having more jute mills?—*A*. I think more will come into existence. As I told you, one particular jute mill, which was defunct, was re-started a few years ago I do not think there will be any difficulty in bringing into existence more jute mills, as soon as the war conditions cease.

Q. You say that the zamindar does not interest himself in industrial enterprise; can you say what is the reason for it; is not zamindar in Madras sufficiently educated?—*A*. Oh, no; he has received an education which has not turned his mind to the needs of his country. Of course there are honourable exceptions.

Q. You have some very highly educated zamindars?—*A*. There are only one or two. Even those few do not address themselves to the things that the country most needs

Q. What do they invest their spare capital in?—*A*. In buying other zamindaris.

Q. What remedy do you propose for diverting their capital to industrial enterprise?—*A*. The better education of the zamindar.

Q. Do you think if you had a commercial college in your province, they would be attracted to it; would they send their sons to receive education there?—*A*. Oh, yes.

Q. You suggest that Government should pioneer factories in certain directions which you mention. Have you submitted any proposals in this direction to Government?—*A*. Not as yet. The idea was never in the air that Government could be brought to pioneer industries.

Q. You feel more hopeful now?—*A*. Yes, because the question has been raised.

Q. Who is the present Director of Industries; is he a Member of the Civil Service or a business-man?—*A*. The present Director is a Member of the Civil Service.

Q. Since, when has he held this office?—*A*. I think Mr. Tressler was the last Director of Industries and was drawn from the Engineering Department.

Q. And since when has the present gentleman been in office?—*A.* The last two years; I think it is two years since Mr. Tressler has gone.

President.—*Q.* Gone where?—*A.* Gone to the front.

Q. I saw him only last August?—*A.* Perhaps he ceased to be Director since two years.

Mr. A. Chatterton.—No, your information is not correct.

Hon'ble Pandit M. M. Malaviya.—*Q.* You have heard nothing about the matter of the experiments in the pencil factory?—*A.* A few pencils were brought up for exhibition but I have never been told if they are being manufactured in sufficient quantity to be placed upon the market.

Q. But the factory is working?—*A.* Yes, somewhere in Madras. It was handed over to Government. The succeeding witness will be able to give you more information, as he had something to do with the pencil factory.

Q. How does the curriculum of your school differ from that of other schools?—*A.* We make manual training compulsory, from the primary class upwards; and drawing also.

Q. What other kinds of manual instruction do you give?—*A.* Our youngest boys are put to cane weaving in the primary class, making little baskets. In the higher classes we turn them over to carpenter's work, making models in wood.

Q. Have you got a copy of the prospectus of the school?—*A.* I have not got the curriculum of studies; I have got a report with me.

Q. When was this school started?—*A.* Ten years ago, in 1907.

Q. Did it begin to attract students from the time it was started?—*A.* We started with five students.

Q. Are your students who pass through the school admitted into colleges?—*A.* Not in the Madras University. Calcutta is a bit fairer, because it takes boys on their merits. Two of our boys, who, we found were somewhat literarily inclined, were sent to Calcutta. They examined them and took them into the Matriculation class.

Q. Do they not appear for the school certificate examination?—*A.* No, because the school is not affiliated to the Madras University, because it departs from the curriculum of study which the Madras University has evolved. We have made Sanskrit compulsory, which is sufficient to prevent affiliation to the University. We don't charge fees, which is sufficient to secure disaffiliation.

Q. Have you made any representation to the Senate to recognise your school?——*A.* I don't think it would be of any use, because we depart from the curriculum of study in certain material respects.

Q. If you made a reference to the Senate and asked them to recognise the school, they might consider the matter?—*A.* Yes, but it might interfere with the freedom of the school. We want to experiment and want our hands free to experiment.

Q. What kind of employment do your boys get after they pass through your school?—*A.* We educate them up to a standard that corresponds to the Matriculation standard of the Madras University. At that point we allow our boys to take to one or other of the technical courses. We provide a number of openings for such boys. There is a slight civil engineering course, but our ambition is to train surveyors, so that our pupils can find work under survey parties, and may be taken into Local Boards and Municipalities. Under stress of circumstances that course has been opened as a refuge for school final failures. We have opened a mechanical engineering workshop, which is the best side of the institution. There we give them a full and complete training in engineering work. There is a foundry section, and we are able to cast articles and design and make things. These boys after four years of training find it very easy to obtain employment under various mills; as a matter of fact our own institution is absorbing all the products of our training. We once had a number of workmen from Madras and elsewhere, whom we are replacing with our own boys.

Q. What do you mean by "workmen"?—*A.* Men who have been trained in Madras and elsewhere, who come to us aged, and whom we want to replace by our own boys for moral rather than any other reason.

Q. Have they sufficient technical skill, these workmen whom you replace?—*A.* The workmen have the necessary technical skill, i.e., the bare manual skill. A man would be a good turner, but has not the mind that could address itself to the principles underlying turning work. Unfortunately most of them are drunkards, and we cannot have workmen in the institution who are not absolutely above reproach. The boys who are receiving training are pupils who grow up with self-respect in them, and care for the respect of others.

Q. So far as the work itself is concerned, how do your boys compare with the workmen whom they are replacing?—*A.* The boys who have had some years training now still compare very favourably. Only two months ago our best turner rebelled against the orders of the Superintendent, and he had to be sent off. I was a bit afraid that the work might not go on as well as it did before, but the last two months have proved that some of our boys could be trusted to do the work.

Q. Do you keep an eye on the after-life of your boys?—*A*. We have not had any experience of that ; only two or three boys have gone out of the institution. All the rest have been engaged by the institution. Of the two gone out, one is a supervisor of a mill in Tenali, and the other is in charge of a pumping installation.

Q. What wages do such boys get in your factory?—*A*. We still regard them as students, that is why we are paying them stipends rather than wages. The stipends range from Rs. 3 a month to Rs. 10. We pay Rs. 3 to the boy who just enters the moulding shop ; that is one way you can induce boys to enter the moulding shop.

Q. When you employ them regularly, what is the salary you pay?—*A*. The boy who went out and who is now supervisor is getting Rs. 40.

Q. When does his technical portion of education begin ; when does he begin to specialise?—*A*. There are two points at which the boys are allowed to break off into this mechanical course ; one point is at the close of the high school, but there are few who can keep away so long from specialising. At the end of the third form there is a complete round of courses, and at that point we allow them to specialise.

Q. After the Matriculation course is over, you keep them on for four years?—*A*. From four to six years ; four years for the apprentice course, and six for the engineering course, simply to stimulate interest in the boys for the higher courses.

Q. You say here that the present system of education is designed to meet the needs of existing industries, and you recommend that what should be done is to supply the needs of industries which are to grow now. You say that the Pachayappa charities have started and worked a few institutions with the distinct object of feeding existing industries?—*A*. Of finding men for existing industries.

Q. You want the education to be broader now, to train foremen for taking charge of existing industries?—*A*. Yes, men imbued with a little imagination. For instance, ordinarily the idea of an industrial school is simply to train a man who can be placed in charge of rice mills, or who can work as a turner at Oakes & Co.

Q. I understand you want a basis of liberal education, and technical education afterwards?—*A*. So that a boy's imagination might be expanded. We have been trying our hand at small pumps. I should like our boys to interest themselves in the work of designing pumps and making them, i.e., making an effort in the direction of original work.

Q. You think that if there was some system of technical schools, such as you recommend a large number of young men would be attracted to it?—*A*. Plus something else. I think in the scheme of what is called "general education", there must be a manual training side. Every Indian boy must of necessity go through that.

Q. You would make manual training compulsory throughout the high school course?—*A*. Yes, so as to enable a boy to know his own aptitude, to discover his own tendencies, inclinations and capacity.

Q. You are very strong about the control of industrial schools. You say that this should be in the hands of "the Director-General of Education, aided perhaps by a Board of Scientific and Industrial Experts"?—*A*. The educational side should be under him.

Q. You think if the schools are placed under a separate Director, they would not have the same attraction for our youths, as the ordinary schools would have?—*A*. Yes, it may sound a bit overbold for me to say it, but I have another idea more drastic. The whole scheme of education should be recast ; the educational ideal must be kept entirely separate from the service ideal. The educational instruction must exist for itself ; service must be entirely apart. Government service may be recruited by special examinations, if they care to have them. Take the question of the tahsildar. These may be recruited from men of the district, and anybody may sit for the examination, and the tahsildar may be asked not so much about Shakespeare and Milton, as about the local conditions of the district, the people, the crops, the industries and the possibilities and resources of the district. It may be more worth while, in the case of some people, for Government to recruit their employees—this remark also applies to lawyers without making it necessary for everyone to go through the University. So that if the service ideal were kept apart, education would exist for itself, and help to develop the culture of the people. It seems to me if this change were made, there would be numbers flowing into the technical schools who would qualify themselves for the practical industries of the present age. That is my belief. I have found it exceedingly difficult for practical handling. This is the crux of the problem how to induce people to go into these technical schools and take kindly to industries in general and mechanical engineering in particu

Q. For the examination of tahsildars, would you make a knowledge of agriculture and the agricultural possibilities of the district an important subject of the course?—*A.* For a tahsildar I would do it. This man lives his life among the ryots.

Q. At any rate you wish that there should be more options of subjects?—*A.* I also want that these people may not go into these institutions with the one idea of service.

Q. Have you experienced any difficulty in finding capital, beyond the case you mention. Do you know of any difficulties which these firms have in financing their industries?—*A.* Not as regards rice mills. You cannot prevent a man with a little money from going into rice mills and establishing one.

Q. For financing their industries and marketing their products are they any banks in your district to help?—*A.* There is the Madras Bank.

Q. Has it branches in your district?—*A.* Many ; three or four.

Q. Then all the financial needs of your district are met by the banks in that district?—*A.* As far as the existing industries are concerned, though anybody would welcome money at a lower rate of interest than obtains in the district.

Mr. C. E. Low.—*Q.* I should like to know more about the circumstances under which the institution of such a school became possible. Who are the people who put the money into it?—*A.* The Indian Judges of the High Court of Madras.

Q. People with local connections and interests?—*A.* They started it in the first instance, but everyone else has followed. I suppose that is a testimony to the keen desire in the country for such institution.

Q. It is a general public interest and not a purely local interest of the district?—*A.* It is a purely local institution, but because the idea was novel, all the people have helped it.

Q. Do most of your funds come from inside districts or outside?—*A.* From inside.

Q. Who are the people you describe as so enterprising ; are they Brahmins or non-Brahmins?—*A.* First I would place the pleader ; secondly, comes the merchant who is not very liberal. A few liberal merchants, however, have given money. Thirdly, the ryot has given money. The ryot in the Kistna district is a very educated man.

Q. You get a number of educated ryots who have degrees to show?—*A.* There are a few who have gone back to agriculture.

Hon'ble Pandit M. M. Malaviya.—*Q.* After taking their degree?—*A.* Yes, but a very, very few.

Mr. C. E Low.—*Q.* You get a number of ryots who know English?—*A.* There are a number who are well posted in the ideas of the age. There are Telugu papers which have free circulation. The Telugu ryot reads the papers and takes an interest in things that move the world.

Q. He reads and writes in the vernacular freely?—*A.* Yes, very well, and reads the best books in the vernacular.

Q. Is admission to the school limited to people of any particular caste, or to people from the district?—*A.* No particular caste. All people come into it.

Q. You are giving an industrial bias to general education, and you don't want that looked down upon by the boys and their parents as something below the ordinary average general education in the country and that is why you think if it was put under the Educational Department, it would be more respectable?—*A.* Yes.

Q. Do you think that an institution which takes boys after they have had a general education and intends to turn out engineers, or mining people, or weaving masters, is suitable?—*A.* Why not? The Civil Engineering College is still under the University.

Q. That is scarcely a case in point. I don't consider that a technical institution really succeeds unless it can go into the open market and its boys can compete with other products from elsewhere and get freely accepted by industrial concerns. Is that a fair test?—*A.* That I understand.

Q. Does the Engineering College here come under that test?—*A.* Yes, but the boy is no use. The boy immediately he comes out of the Engineering College does not make an engineer, and cannot be trusted. He is then put as an apprentice under more experienced people ; in the same way after the mechanical or industrial career is over, the boy will be taken to some works. It may be required of him that he should have some mechanical experience.

Q. Do you know of any industrial institution training mechanical engineers, not under the management of the Educational Department, whose products get readily accepted by commercial and industrial people?—*A.* I have no idea.

Witness here gave confidential evidence.

Mr. C. E. Low.—*Q.* Turning to another question ; who are the men employed in these small rice mills, etc., as engineers?—*A.* Up to very recently it was merely the oil man of one rice mill who became the engine driver of another. That is how it was.

There are about five or six men scattered through the district who have picked up the art of building a rice mill of the Rangoon or other type, but after the small installation came into existence, every fellow became an engineer. That is the way it has gone on. Very recently—I am speaking of the last year, 1915-1916—there have been some requisitions for men of capacity, men who could build mills to work economically and efficiently. I have known of a case in which a good foreman was paid Rs. 1,000 to put up a mill.

President.—*Q.* What school was he trained in?—*A.* He was not trained. He was for some time foreman of our institution.

Q. They are improving themselves without the help of the school?—*A.* He was trained in our school. He came into the institution with the capacity already developed, and has had immense opportunities to develop his skill.

Mr. C. E. Low.—*Q.* I readily think that an enterprise run by Indian capital is worth more than a Government concern run *ad hoc* in your district?—*A.* I admit it. The sight of an industry working successfully would be a great stimulus.

Mr. A. Chatterton.—*Q.* Have you developed the school since I last saw it?—*A.* Yes, we are now doing good work in the workshop.

Q. How much are you spending on this school?—*A.* It costs about Rs. 20,000 a year altogether.

Q. You say, "Most of these enterprises are one-man concerns" in the Kistna and adjoining districts. Do you know anything about the big co-operative pumping installations that have been started?—*A.* I know all about them.

Q. How are they doing?—*A.* One enterprise is a great success, the Atmakore one; the other has practically closed down.

Q. Why is one a success and the other a failure?—*A.* There were certain natural facilities in Atmakore which the other had not. The people that made up the second company were people without enterprise and without the spirit of co-ordination. They have not been able to put themselves together and push work. I have often found them delaying in transplanting paddy and sowing seed beds. The agricultural more than the industrial side is at fault.

Q. You say that there were "numerous pumping installations in and about Kollair"?—*A.* I mean the Kollair Lakes and others. They also have a wood fuel gas engine. You remember you advised us to use coal for the first year, but fortunately the next year we turned over to wood fuel, though it took us quite a year to understand all the points of the machine. We did manage to work it. Now our little boys are in charge of it.

Q. Are the boys in your school associated with all these pumping stations?—*A.* We send our boys over when one is asked for.

Q. These men who own these pumping installations, do they send their sons to you to be trained?—*A.* No, because they are all rich men.

Q. You have only got the boys of poor parentage?—*A.* The only rich man sent there is my brother. It is the poor boys. The agriculturist and the landowner send their children to our school, because we have a complete residential system, so feeling a certain confidence in us they send their boys over to keep them in our charge.

Q. You suggest that cement factories should be started in the Kistna district, but doesn't everybody in that part of the country use soorki mortar?—*A.* They do use it but is not cement very much better than soorki mortar?

Q. But is it not more expensive?—*A.* Every good house in Masulipatam is cemented all round and inside up to a level of one yard.

Q. Then you suggest that a sugar factory should be started at Samalkot. There is already a very large one there?—*A.* I always speak from the point of view of augmenting enterprises in the country. I think there is need for another.

President.—*Q.* We should like to know your own up-bringing, your training, and why you took to this particular work?—*A.* Immediately after my graduation I was sent over to Ootacamund by Dr. Bourne, who was my Professor, to work as Assistant to the Government Botanist. I was there for about two years in Ootacamund then the dominating influence of my life brought me over to law. My father is a very cultured and enlightened man. He wanted me to go into law. I went into law and passed my examination, but did not like it, so I turned a school master.

Q. Where did you get your assistants who teach the practical side?—*A.* We had a number of mistrees at the beginning, with an engineer, to supervise their work. The same thing holds good now. We have a number of young men working in it, who teach the boys. A young man who studied in the Victoria Technical School, and subsequently had workshop experience, started a workshop of his own had two years experience in it, and subsequently the workshop having been disbanded, he came over to our institution.

Mr. C. E. Low.—*Q.* Where did you yourself become permeated with the spirit of mechanical engineering?—*A.* It was simply an effort to do something that would prove of use to the people and the country. I was never an engineer myself.

Q. Do you still keep up your botany?—*A.* As much of it as goes to agriculture; not much.

Hon'ble Pandit M. M. Malaviya.—*Q.* Do you raise all these Rs. 20,000 from subscriptions annually or monthly?—*A.* No, annually. It is a precarious earning. Of the 20,000 our workshops give us from six to eight thousand.

Q. You earn six to eight thousand from your workshops, and the rest you collect?—*A.* Not the nett profit really; we lose a couple of thousands on the workshop because we indulge in a little experimenting.

Q. The rest of your income is made up of donations?—*A.* Partly from property we have been able to purchase up to now from subscriptions and gifts of land. A few ryots have given us some money. One ryot has given us as much as ten thousand rupees worth of property.

WITNESS No. 207.

THE HON'BLE RAO BAHADUR K. SURYANARAYANAMURTI NAYUDU, *Proprietor, Messrs. Innes & Co., Coca[illegible]*

WRITTEN EVIDENCE.

Capital.

Innes & Co. is one of the old firms of Cocanada. Originally Mr. Innes and my father were the partners. At my father's death 20 years ago I became a partner and in 1908 Mr. Innes retired and I became the sole proprietor. Innes & Co. deal chiefly in the export of rice, oil seeds, jaggery, hemp and jute and are the managing agents of a rice factory known as the Coringa Company, Limited, for over half a century. In that concern I own about two-thirds of the shares and I have been managing the concern for the last 20 years. I have found no difficulty in finding the necessary capital for the factory and believe that so far as Gōdāvari and Kistna districts are concerned, there will be no difficulty in finding capital for a rice factory, as the rice trade is a well tried and old established one, and people know all about the business and do not hesitate to invest capital. But then I personally think that the rice trade has grown to so large an extent in latter days, that there is no further scope of expansion or profit and that enterprise has to be diverted in other directions. In the early years of my experience the profits were very good but latterly there has been a very large increase in the number of factories all over the delta districts with the result that competition in purchasing paddy and selling rice grew and brought down the profits to a nominal figure and in fact several late years have shown a loss. I should think that it is high time therefore that in these districts the industrial enterprise should be diverted to new channels. For instance different kinds of oil seeds such as castor seed, gingelly seed, niger seed, rape seed, ground nuts, copra and cotton seed are available in large quantities in the northern circars and are at present exported largely to foreign countries. Factories to extract high grade oils by scientific and improved methods may form a good opening for the investment of capital.

It is not however easy to raise capital for new industrial undertakings. Personally I found great difficulty in raising capital to float a pencil factory in our city on a proper basis. We bought the necessary machinery and even started a factory but after working for a year or so, we had to close it as our experiments proved a failure and expert advice could not be secured. The factory was handed over afterwards to the Government as the Director of Industries proposed to conduct experiments on behalf of the Government and bring it to a commercial basis. The results of his experiments are not yet known although fairly good marketable pencils were produced latterly.

Technical education.

People are very shy of investing their monies in new industries, chiefly owing to the lack of the necessary technical education and expert advice, calculated to infuse confidence. If both are available, I do not think that there will be much difficulty in raising capital. At present much of the capital is invested in lands, Government paper and debentures and in fixed deposits in banks. In order to divert the capital to industrial undertakings, the Government will have to take such measures as will show to the public that investment of capital therein would give better returns. To such an end I venture to suggest the desirability of establishing industrial schools in all important trading centres and also to form an industrial section to the course of education in secondary schools. To advanced students, commercial colleges may with advantage be established in provincial centres for giving a course of training on up-to-date methods of business. As for the labouring classes employed in factories, etc., night schools for imparting some general education will be of great benefit, resulting in making at least some of them into skilled labourers. I would also further suggest that the Government should send out year after year for a number of years young men with good education to advanced industrial countries to study the methods there, and on their return, they should be made available through the Government to help in the new industries, wherever such help is sought.

Official organisation

I think it is necessary to have in every province a Director of Industries who shall be an administrator and shall have under him expert staff to give the necessary advice on technical matters. When people come forward to float a company for a new industry the Government will have to lend the services of an expert for a certain number of years and will have to guarantee dividends for a certain period or till it is brought to a commercial basis. In some cases where capital may not be available although there is scope for a new industry and people come forward, the Government will have to grant loans free of interest for a limited period or till it reaches a commercial basis. Such a system of Government aid will have, more than all, the effect of infusing the necessary confidence in the public in its present industrial backwardness and to give the necessary stimulus to industrial progress.

Steps should also be taken by legislation to prevent adulteration of articles for manufacture, such as jute, hemp, cotton, grain and seeds, either by wetting or by mixing sand, etc.

The railways should, as far as possible, maintain a uniform mileage rate of freight and not give special preferential rates to big ports, situated at long distances away from the products, as otherwise the small ports which are the natural outlets would lose all their trade.

I think it is desirable to introduce a system of registration of partnerships.

ORAL EVIDENCE, 23RD JANUARY 1917.

Sir F. H. Stewart.—*Q.* You are the proprietor of Messrs. Innes & Co.? Is your business mostly export?—*A.* Yes.

Q. Are there many Indians engaged in the export trade in this part of the country?—*A.* Not directly.

Q. About the rice mill may I ask if that is a paying concern?—*A.* It was paying for a long time. Of late the profits are not very good.

Q. Owing to too much competition?—*A.* Yes.

Q. Is it a public concern?—*A.* It is a joint stock company.

Q. You say that you have found no difficulty in finding the capital for the factory. Have you raised additional capital?—*A.* For the working capital we used some of our own money and whatever we required for other purposes we took from the banks.

Q. You had no difficulty in getting money from the banks?—*A.* No.

Q. Then with reference to the pencil factory that you have mentioned, we have heard something about it. That was in Cocanada?—*A.* It was brought from Bimlipatam where it originally was.

Q. Why did you take it to Cocanada? Was that a suitable place?—*A.* We removed it only to have it under our own supervision, because on account of bad management the factory did not work properly. So we had it removed. When we had got it under our own supervision we thought we could run it better.

Q. Did you know anything about pencil-making before?—*A.* There was a man who went to Japan and there he learnt the trade to some extent and after his return he advised us about the machinery, etc. For a year we tried and the results were not satisfactory.

Q. Are these experiments in pencil-making still being conducted by Government?—*A.* Yes.

Q. And they are getting wood from East Africa?—*A.* So I believe.

Q. So that Cocanada is not by any means the ideal centre for a pencil-making factory?—*A.* We wanted to try with the local wood also.

Q. And that was not successful?—*A.* No.

Q. In the next paragraph you speak about the investment of capital. You say "In order to divert capital to industrial undertakings the Government will have to take such measures as will show to the public that the investment of capital therein would give better returns." Is it that you want that people should expect better returns from industrial undertakings than they can get it out of land?—*A.* At least the same returns if not more. The same amount of money that people are getting out of investment in Government paper and debentures.

Q. What is that which is hindering the investment in industrial undertakings?—*A.* The doubt that the thing industrially would not be a success.

Q. What you want to do is to create confidence?—*A.* Yes.

Q. And with that end in view you suggest that Government should send out year after year for a number of years young men with good education to advanced industrial countries to study the methods there and that on their return they should be made available through the Government to help in the new industries wherever they should be started. Do you think they could do pioneering work?—*A.* Yes.

Q. You think they will be capable of doing that?—*A*. They should be able to do that if they receive proper training.

Q. Have you come across any of the students that have been sent by the Government to foreign countries?—*A*. No.

Q. You speak of the need there is in every province for a Director of Industries. You are a business man yourself? What class of man should he be? Should he be an official or should he be a scientific and technical expert or should he be a business man?—*A*. He need not necessarily be a technical or a business man. He must be an able administrator.

Q. You will put that then as his first requirement, a knowledge of men, how to manage rather than a knowledge of any particular branch of industry?—*A*. Yes.

Q. You then suggest that steps should be taken by legislation to prevent adulteration of articles for manufacture such as jute, hemp, cotton, grain, and seeds? Do you think that it is practicable?—*A*. Of course there will be some difficulty about it. I propose that a committee may be appointed to make enquiries and submit definite proposals about it.

Q. You are a member of the Madras Council?—*A*. Yes.

Q. You think that Government should take up and go into the matter and appoint a committee for this purpose?—*A*. Yes, to advise on what lines legislation can be made.

Q. How do you imagine that such a proposal would commend itself to the cultivator or the seller?—*A*. At present we do not know whether it is the cultivator or the middleman or the merchant that adulterates the stuff. In some places it is the cultivator that does it.

Q. You buy for export. You suffer from adulteration I suppose. Do you think that the trade generally would welcome such legislation? I mean the export trade?—*A*. I think so.

Q. As a practical business man you think they would?—*A*. I think that the exporters will certainly welcome it.

Q. With the idea that they would get a better price for their produce?—*A*. At present the prices that we get are on the assumption that we export good stuff. The quality of the article is found only after it reaches the port of destination. If the article is found inferior then claims are made.

Q. You are allowed a certain margin?—*A*. That is so in some instances. That is only for slight loss in weight.

Q. Is there a margin for quality?—*A*. There is no margin for bad quality. It is only in some cases where the articles get deteriorated by remaining for a long time in transit.

Q. Any system of examination and certificates would tell in favour of the large ports, would it not? You are not putting forward a plea for Cocanada. It is not a large port?—*A*. I refer not for Cocanada only but for all small ports.

Q. You could not take steps to prevent adulteration in all the smaller ports?—*A*. At present we have not the staff to do the inspection. There might be one man for each of the smaller ports.

Q. In the last sentence of your note you say that it is desirable to introduce a system of partnerships. That is an answer which we have had everywhere. Do you believe that to be practicable?—*A*. If the Government were to say that every firm ought to be registered then there will be no other alternative but to register.

Hon'ble Pandit M. M. Malaviya.—*Q*. You say that people are shy of investing their money in new industrial undertakings chiefly owing to the lack of the necessary technical education and expert advice calculated to infuse confidence. Do you think that if you had a sound system of technical education and the people were educated they would come forward to invest money in industrial undertakings?—*A*. Yes.

Q. You recommend the establishment of industrial schools in important trading centres and you also recommend that there should be an industrial section in the secondary schools. Do you think that the change would be popular and that our boys will readily take to the industrial education?—*A*. It may be unpopular in the beginning but in a few years I think that most of the boys will take it up. That will be in the course of a few years.

Q. You mean that the tendency will be in favour of the change?—*A*. Yes.

Q. You advocate the formation of a commercial college. Are you in favour of a commercial college in every province?—*A*. I would have at least one in every province. If not there should be one for the whole of India, a thoroughly well-equipped college.

Q. But you think that it would be much better to have such colleges in every provincial centre?—*A*. That would be much better.

Q. If there were only one central college for the whole of India do you think that students from all parts of the country will go there?—*A*. I see that even now some students are going to Calcutta for the study of medicine.

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Q. That is because they have not got an institution in their own province. If there was an institution in the province then students will take advantage of it rather than go to a distant province?—*A*. Yes.

Q. Do you think that zamindars will be induced to send their sons to the commercial colleges?—*A*. I am not quite certain about the zamindars. But well-to-do ryots and merchants will do it and then the other people will also come in.

Q. If administration also is taught, then, probably the zamindars may send in their sons?—*A*. Yes.

Q. It is only when people come forward that Government could lend the services of experts for a certain number of years. That would only apply in the case of an industry which has not been worked successfully either in this province or in the neighbouring provinces. When you have an industry working successfully in a neighbouring province, then people will take advantage of the knowledge derived there and start an industry in their own province. Don't you think so?—*A*. When there are industries working successfully in the neighbouring provinces we do not require any special advice from Government or any such thing.

Q. You want information about it to be furnished to the general public. Do you think that a bureau of information would be useful?—*A*. Certainly.

Q. Do you think it would be a good thing if the bureau published information from time to time both in English and in the vernacular?—*A*. I think the medium of English will be enough for the present. In many of the places English is well understood.

Q. Do majority of the men who carry on trade know English?—*A*. No.

Q. Don't you think that for their benefit the information should be published in the vernaculars?—*A*. In many places the men have people to translate to them. If there could be vernacular translation also that would certainly be advantageous.

Q. Have you got any banks in your district to finance industries?—*A*. There are no separate banks to finance industries alone.

Q. Do the existing banks finance industries in any way?—*A*. No doubt the existing banks give loans to people but not to industrial concerns as a body.

Q. On what security do they advance money to business men?—*A*. On personal security of two substantial men and on the security of goods.

Q. Don't you think you want a bank which would advance money to industries on the security of the plant, the machinery and the buildings also?—*A*. Yes. That would be very helpful in the case of any new industries that may be started.

Q. You say that such a system of Government aid will have the effect of infusing the necessary confidence in the public in its present industrial backwardness and to give the necessary stimulus to industrial progress. You are not particular about the exact form in which Government aid should be given. What you want is that by extending its moral support and also its financial support Government ought to show that it wants to encourage enterprise?—*A*. Yes.

Q. You say that the railways should maintain a uniform rate of mileage. Don't you think that many of the difficulties that at present arise are due to the fact that the railways are managed by different companies?—*A*. Yes.

Q. Don't you think that it would be much better if the State managed all the railways?—*A*. I would much prefer to see the management in the hands of the State.

Mr. A. Chatterton.—*Q*. You refer to the over-development of the rice industry in the district and you suggest that the question of oil extraction might be taken up. How do you propose to deal with the oils that are extracted. Where is the market for them. Have you any definite ideas on the subject?—*A*. For a long time I was managing a castor oil factory. From the beginning of the war all the oil seeds are now being crushed locally. They are now crushing ground-nuts and we are finding a market for them locally. It sometimes goes to the coast ports.

Q. Does the local market absorb them all?—*A*. I cannot say that.

Q. Are they using this oil for lamps?—*A*. Not ground-nut oil. They are mixing ground-nut oil with other oils such as the cocanut oil and also the gingelly oil. It is used for edible purposes because it is cheaper.

Q. I have just one other question. You suggest the desirability of establishing industrial schools in the important trading centres. What is your idea of an industrial school?—*A*. Just for training the mechanics.

Q. Do you think that the production of a few mechanics will lead to considerable industrial development?—*A*. For large industrial development we require higher industrial colleges and more efficient men.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. Did you start this rice mill?—*A*. It was started in my father's time.

Q. Have you got any reserve funds?—*A*. Yes.

Q. You are not working at a profit?—*A*. No.

Q. On account of the war?—*A*. Not on account of the war. War has also affected us to some extent. We are not able to give full work to the factory.

Q. You say that in some cases where capital may not be available although there is scope for a new industry and people come forward the Government will have to grant loans free of interest for a limited period or till it reaches a commercial basis. Loans on what security?—*A*. On the security of the factory itself.

Q. You say that if there is profit it must go to the people and that if there is loss it must go to the Government?—*A*. I understand it as a sort of pioneer factory.

Q. In the place of Government giving money to the people don't you think that it would be much better if Government started a pioneer factory?—*A*. My proposition almost comes to the same thing. At present the people want to be educated in order that confidence may be infused in them.

Hon'ble Pandit M. M. Malaviya.—*Q*. Do you mean that Government should first pioneer the industry and then hand it over to private enterprise?—*A*. Yes.

WITNESS No. 208.

MR. K. SURYANARAYANA RAO, *Proprietor, The Indian Commerce and Industries Company, Rice Mill Owners, Machinery and Mill Store Merchants, Madras.*

WRITTEN EVIDENCE.

Capital over production.

Q. 3. *Rice milling*.—This is one of the large and important industries in the Madras Presidency that is being carried to excess by the increasing number of factories year after year, and one that is suffering for want of full employment throughout the year. The districts of Kistna and Gōdāvari are the chief centres of this industry and contain mills of large and medium capacity. In the working of most of these mills, economy and efficiency are not at all observed as the machinery is handled by men who do not know their work and who have not had any training for it. In a good many cases, the mills were not constructed by duly qualified or experienced engineering experts, and factories are even today being constructed by irresponsible persons, who possess a little knowledge of carpentry or smithy work, on the system of trial and error, with the result that some mills have undergone two or three reconstructions after the original wrong construction. This state of things is due to lack of expert advice and demonstration factories. To quote my own experience, in the year 1900 we searched for an engineer to construct a rice mill. We got and employed one on a salary of Rs. 250 per mensem. He dragged on the construction of the mill, introducing unnecessary and ill-suited appliances into the mill, which we could find out only after the finishing of the construction, and he had to learn everything at our expense. In the end it turned out that he was a good mechanical engineer, well versed in the construction of cotton gins and cotton presses, and we had to demolish the whole mill constructed by him and the affair involved us in a total loss of Rs. 80,000.

During the last 5 or 6 years, the people in the Southern districts have largely taken to this industry and have already constructed, I believe, a larger number of mills than are necessary and new factories are being constructed, even today in places where there is already a good number of them. Owners of these mills have complained to me that there is not full work for their mills and that they desire to convert their factories to manufacture something else that is profitable. The want of pioneer factories in the province has made enterprising people who want to invest their money in industries helpless and has not given them any opportunity to think of new industries with any confidence of success. Thus they have naturally found it safe to follow in the footsteps of industries that have been already taken to by people largely and with some success. The starting of pioneer factories will give a right direction to the spirit of industrial enterprise that is largely and speedily spreading in the country. To say a few words about the method of construction of the mills in the South,—in the districts of Tanjore, Madura and other places the machinery that is adopted for the purpose of making rice is one that is ill-suited and it consists generally of an oil engine of 16 to 20 b.h.p., and a combined rice huller and polisher. The percentage of yield of rice is very poor, the husk that may be used as fuel with advantage is not at all made use of for that purpose, and the cost of renewing parts is excessive and disproportionate to the working. When complete and proper mills are installed side by side with the existing ones, these mills will have to yield place to them and the whole or a good portion of the investment must be considered as loss. It was at the recommendation of the Department of Industries that people took to this method of factory construction. I know that the Department of Industries charged a fee to give and repeat the same advice to persons that have sought its advice for constructing rice mills. Referring to this state of industry, I contributed an article to the 1912 June issue, of the "Wealth of India", a journal in Madras, under the title of "Rice Milling in Southern India" and the above statements I make, from my experience as the owner of one of the earliest rice mills started in the province and as one in touch with mills and factories as a supplier of machinery and mill stores to a good many of them.

To remedy the evils of this industry, I propose a demonstration factory in an important centre where up-to-date machinery and appliances adopted to the making of rice, both for export and local consumption, should be worked and exhibited. Expert advice and guidance must be made available to the present and prospective owners of mills to run their mills with efficiency and economy. The addition of auxiliary or alternative industries like cotton spinning and oil pressing will improve the prospects and the prosperity of these factories and here again I repeat that the starting of pioneer factories will assist and enable people to think as to the industries they can successfully append to their existing concerns. As an instance, I may say that most of the factories that were carrying on cotton ginning in the season have appended rice mills as an alternative industry and the working of these factories is found more profitable.

Government assistance.

I cannot say with any certainty that there is any industry in this Presidency that has received noticeable benefits from researches conducted by Government Departments excluding the two pioneer industries of chrome leather and aluminium. Learning that the Department of Industries has studied the question of expressing oil from cotton seed and that Government budgeted some funds for carrying on experiments in new industries, I addressed a letter on 1st April 1914, to the Director of Industries, Madras, requesting him to make an experiment at Bezwada for cotton seed oil and stating that I would give the land free in a convenient place and also supply raw material for one season. But the Director did not seem to have given due consideration to the proposals to develop this new industry and the Anderson's Screw Oil Press that was purchased by the department for carrying on the experiments was used in some other way and that without any success.

In and all around Bezwada and Guntūr, within a radius of a few miles there are several cotton ginning factories which sell large quantities of seed to exporters to foreign countries. There is abundant raw material for a mill and the starting of a pioneer factory for this industry is very necessary. Or if the Government will give its support by obtaining the necessary machinery and plant, and by guaranteeing a dividend of 6 per cent for two years, a joint stock company may easily and readily be formed having for its shareholders many of the owners of the ginning factories.

Portland cement.

Certain places in this province are excellently suited for the location of a factory to manufacture cement, by the abundance and richness of the approved quality of lime and clay which constitute the component raw materials required for this industry. I and my brothers made efforts to start a cement factory in the year 1900 at Bezwada, erected buildings for the purpose, and acquired land for same, and purchased some preliminary machinery also for the testing of cements, etc., but had to give up the undertaking for want of expert guidance and advice and had to convert the concern into a rice mill. We went to Bombay in search of an engineer but could get only one who said that he knew nothing about cements but that he could construct a rice mill. The experiences we had with this engineer were detailed above.

In the whole of the Madras Presidency, there is only one cement factory and the foreign imported product to the annual value of about Rs. 15 lakhs, is consumed in this Presidency alone. There is a great desire on the part of many enterprising men and capitalists to start a factory for the manufacture of this material at a convenient centre, and a joint stock company can readily be floated provided the Government will give its co-operation by the grant of a few acres of land, in a suitable place free of rent and by obtaining the necessary machinery and plant from Home, and by securing the necessary expert advice and information. More help than this is not necessary.

Official organisation.

We have a Department of Industries in our province that is intended to develop the indigenous industries and this department, as it is constituted, cannot fulfil the functions properly, as it contains neither experts nor experienced business men, but only men of the Public Works Department, who passed their examinations in the Provincial Civil Engineering College, who have no opportunity of having any practical experience of any industry and who even after selection to the office are not deputed to undergo any special training. I cannot say that any useful purpose has been served latterly by this Department of Industries nor is any useful purpose likely to be served, if it is continued as it is.

For the development and protection of industries, an organization of the Government is quite a necessity and it should consist of a Director of Industries and experts who have Indian and foreign experience in the prominent existing and prospective industries and who are fit by their knowledge and experience to guide and inform those that are engaged in their respective industries. It is desirable that the Director of Industries and the experts should be Indians, as far as practicable, to facilitate easy exchange of views and intercourse with their countrymen and the running of the department at a comparatively low cost. The Director of Industries must be more of a practical business man with administrative experience than a mere expert.

There should be an Advisory Board of Industries to aid the Director of Industries and it should consist of business men who are engaged in prominent industries and its function should be to assist the Department of Industries with its opinions, advice and information, both as to the existing and prospective industries to be developed, with regard to their furtherance and prosperity. The Director of Industries should be endowed with executive powers and budgeted funds and should keep the Advisory Board informed of all the movements of his department with regard to industries. In matters where half or more than half the members of the Board differ from him, he will refer such matters to Government for final settlement. The Director of Industries and the Advisory Board may be co-ordinate functionaries, subject to the control of the Provincial Government.

College of Commerce.

The establishment of a college of commerce is a great desideratum in our Presidency. At present, the demand for duly qualified men, to manage factories and business concerns, is very great, and is increasing day by day with the growth of factories and business concerns. By bringing into existence men duly trained in commerce, they can manage industrial and business concerns with greater economy and efficiency, and will surely conduce to the prosperity of industries. The training received in a college of commerce by the sons of rich capitalists and landholders and those that have natural propensities for business, will enable them to take to trade and will induce them to think of starting new industries and will also serve as a great incentive to the development of industries and promotion of trade. This will at the same time be a great diversion to young men from the present day University education and the love of learned professions that it engenders, and it will enable them to seek employment elsewhere than under the Government and thus also creates new opening for private service, not to speak of the scope it affords to people to become business men on their own account. The curriculum of studies should include among other subjects, business organization, management of business, advertising, salesmanship, and other allied subjects necessary for the practice of business.

Hydro-electric power.

A scheme has been contemplated in our province with reference to the Kistna Reservoir Project and further investigation into the possibilities of this scheme might contribute to the industrial prosperity of a good portion of the Andhra country.

Industrial bank.

The opening of a provincial industrial bank with branches in important and suitable centres for lending money to industrial concerns at a rate of interest not exceeding 6 per cent will serve as an efficient and substantial aid to the promotion of the existing and to the development of the new industries. Applications for loans may be referred to the Director of Industries in Advisory Board, as constituted in the manner above described, for their recommendation.

ORAL EVIDENCE, 23RD JANUARY 1917.

Mr. A. Chatterton.—*Q.* You have no objection to giving us a short note about your firm?—*A.* No. The Department of Industries required a statement like that from me and I have sent it marking it confidential.

Q. You say that the working of the factories that you have in the Gōdāvari and Kistna districts is in the hands of men who don't know their work and who don't do it economically and efficiently?—*A.* Yes.

Q. What sort of wages do you pay the men who run these factories and mills?—*A.* They range from Rs. 250 to Rs. 50 a month. They vary very largely.

Q. The owners of the mills have no knowledge of the business themselves?—*A.* No.

Q. Do they interfere much in the working of them?—*A.* They depend upon their maistries.

Q. Do they restrict them in the matter of repairs and upkeep of machinery?—*A.* No. The maistry does everything.

Q. The maistries or men who are running these mills complain to me very frequently that owing to the owners of the mills having little practical knowledge of the running of machinery they do not allow them to undertake the necessary repairs with the result the machinery gets out of order?—*A.* On the other hand, they do more repairs than are necessary and waste the money of the owners.

Q. You are representing the owner's view?—*A.* Mechanically, he does not know much about it and he has not any systematic knowledge of the thing.

Q. What are these factories run with? Steam power or water power?—*A.* Most of the mills in Southern districts are run by oil-engines and probably an equal number in the Kistna and Gōdāvari districts by oil and steam engines, but there are very few run by gas engines.

Q. Where there are water falls have they been used for power purposes?—*A.* No.

Q. Has any attempt been made to get concessions from Government for water power?—*A.* None to my knowledge.

Q. You talk about the introduction of rice mills in the Tanjore district and Madura and other places and you say that the people are not quite satisfied with them?—*A.* Yes. The Department of Industries came into existence when people thought of starting industries in the Southern districts.

Q. Is it not a fact that the great successes of the mills that were put up in the south of India by these owners of rice mills, led to very large number of others to come in?—*A.* Yes.

Q. Did not the people make a lot of money in Tanjore and Madura?—*A.* In the absence of better constructed mills they could make profits out of the mills because there was no competition, and efficiency and economy were never cared for.

Q. They possessed a great advantage over the old methods of dealing with the thing by hand?—*A.* Even that I cannot say, because the percentage is very much less in the system adopted in the southern districts.

Q. Is it not a fact that, owing to the successes of these small rice mills that were installed and the competition that has been introduced in consequence, more enterprising men have now gone in for a higher type of mill so as to effect greater economies and thus compete on satisfactory terms with the small mills?—*A.* No. Once they put their money into these small mills and found their money was not properly invested and they are now taking to a better type of construction.

Q. Why did they put their money on unsuitable mills in the beginning?—*A.* Because they could not do better and they were so advised by the Department of Industries. That is what I learnt. When I came to Madras to do my business I found that most of the investors sought the advice of the Department of Industries and it was that department that recommended such a type of mills.

Q. It is not a question of the percentage turned out but the question of the number of mills that were established?—*A.* They are growing even today on that system, that is, the same old type.

Q. There must be some advantage?—*A.* In the absence of anything better they are taking to it.

Q. Do you mean to say that these men in Tanjore and Madura put their money in machinery and plant which they knew would not pay?—*A.* Not that. When they know that it pays one man, they follow that man and it might pay the man just in that locality until some two or three more mills were started, and when there is competition the man finds that he is losing and he has to change the construction

Hon'ble Pandit M. M. Malaviya.—*Q.* You said that the percentage of rice turned out by that system is much less than that turned out by hand or by better-constructed mills? What becomes of the rice that is not turned out?—*A.* It goes as waste into the husk. The rice is used for local consumption and exported to neighbouring districts, probably some of it is exported. The difference is about 6 to 8 per cent. The percentage of rice turned out is 54 very nearly and it ought to be about 62 or 63.

Q. These mills have failed because they are throwing away 8 per cent of the original weight of the paddy?—*A.* Yes, and because the renewal of parts also is a very heavy item.

Mr. A. Chatterton.—*Q.* What are these small plants?—*A.* Engleberg.

Q. What is the cost of the installation of these rice hullers?—*A.* Formerly Rs. 750.

Q. The whole plant?—*A.* The whole plant consists of one huller and an oil-engine. The whole thing will cost about Rs. 3,500 to 4,000.

Q. How much would the improved type of mill cost?—*A.* It will range very widely with capacity. It may cost Rs. 15,000 if everything is done cheaply and economically.

Q. There is a big jump from Rs. 3,500 to Rs. 15,000?—*A.* But there is a big jump in the outturn and there is more profit. Six to 8 per cent is a good deal of difference and a man has to waste 6 to 8 per cent of rice.

Q. I don't accept your figure of 8 per cent?—*A.* That is what we have practically found out. In our own mill we have worked both the systems and I have narrated the bitter experience I have had as rice mill owner.

Q. You suggest as a remedy for this thing that Government should establish a demonstration mill?—*A.* Yes.

Q. But are there not 30 or 40 high class rice mills running?—*A.* No. There are very few mills. There are so many mills in the presidency but very few of the mills are provided with proper engineers, not even four or five mills. The Coringa Rice Mill is managed by a proper engineer and the South India Industrial Mill has got an engineer, but I don't think that other mills have got a proper engineer.

Q. If these demonstration mills are put up they will compete against these people?—*A.* The demonstration mills are not to compete. Since people have already invested a good deal of capital in these rice mills and the work turned out is quite disproportionate to the capacity of these mills and there is wasteful work, in order to avoid all that,

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to make the best of the evil, if they have a demonstration factory they can introduce all up-to-date improvements into the mills and show improved efficiency and economy and outturn.

Q. You mean an experimental factory?—*A*. Yes.

Q. What you mean is that Government should establish a model factory and allow the people to see it work and then hand it over to private enterprise?—*A*. No. There are already too many rice mills in the country and we do not want any pioneer rice mills but I want a demonstration factory in this country. I give you an instance. A new "separator" which had a great efficiency for separating cargo rice from paddy was put in a mill in Ellore and they used to command more profits than other mills and they kept it as a secret. If such appliances are worked and demonstrated in a factory the people will adopt the improved methods and will become more prosperous.

Q. Do you know anything about the experimental work that is being done in the chrome leather and aluminium?—*A*. But these two things proved successful and profitable.

Q. And none of the others proved profitable and successful?—*A*. I don't think so.

Q. Don't you find an extended market for oil-engines consequent upon the operations of this department?—*A*. There is more demand for oil-engines by the recommendation of the department for pumping and rice mills.

Q. You wanted to start a cement factory in Bezwada on account of the lime?—*A*. Yes, and good materials.

Q. Is there any market for the cement if made?—*A*. Yes. Cocanada and Masulipatam consume largely.

Q. How many barrels a year are used in the districts?—*A*. I have not an exact idea but I know there will be a sufficient demand if a factory is constructed.

Q. Do you know what the importation of cement to the whole presidency is?—*A*. Sixteen to 17 lakh of rupees worth a year.

Q How many factories would that keep going?—*A*. Some three factories. There is good work for one more factory.

Q. What I wanted to ascertain from you is whether you have made any accurate and definite investigation into the matter, or whether you are making a general suggestion with regard to this?—*A*. I first wanted to start a cement factory but I was disabled for some reasons, and I had to convert it into a rice mill.

Q. Did you make any definite enquiries?—*A*. We sent materials to the Government Chemical Examiner and we got the materials analysed and they were said to be very suitable. But for want of expert advice we could not proceed further.

Q. To make how much cement?—*A*. Hundred barrels a day.

Q. Could it be made to pay?—*A*. Those are all points to be decided by an expert. We want expert advice on these points.

Mr. C. E. Low.—*Q*. I am afraid I have not quite understood why you want this model rice factory here. Is it that you anticipate, if a model factory on an improved style is set up, that the disappearance of the inefficient factories would be complete?—*A*. Yes.

Q. Supposing there is a mouse and a cat comes and eats it and then a tiger comes and eats the cat, which is the superior type of factory? Is it cat or the tiger?—*A*. I don't understand your point.

Q. The industrial department came along first of all with a small plant which was welcomed, and set up a large number of them and then a more efficient thing comes along and destroys it and you rightly want the destruction to be complete in order that more efficient things may spring up But how do you know that this thing will not be superseded by something superior and then you will turn on the Industrial Department and say why did you put up this demonstration factory? Twenty years hence your successors would be coming here and blaming the Industrial Department first for setting up the demonstration factory which you now propose, because it has been superseded by some other type?—*A*. It would not be like that. Money has been largely spent by the people in this presidency on rice mills. The efficiency of these mills has to be secured somehow or other and we have to make the best of the evil and the only way is to make the existing mills work more economically and efficiently.

Q. By the existing mills do you mean small mills?—*A*. Yes. In some of the mills there is no economy and efficiency, and the work turned out is quite disproportionate to the capacity.

Q. You said before that the old type of inefficient mill should be knocked out, but now you say that the old type should be continued and the work should be more efficient?—*A*. A rice mill consists of a number of machines. It has got various appliances and as new plants are invented in foreign countries these people have to be informed about them and have to be shown the success of the thing so that they can adopt the improvements and improve the existing mills so as to work them profitably.

Hon'ble Pandit M. M. Malaviya.—*Q*. Do you mean the old mills can exist with certain improvements effected in parts?—*A*. Yes. That is the only way.

Q. The old mills need not be discarded altogether?—*A*. Need not be. It will be a serious loss if they are discarded altogether.

Q. You only suggest improvements by means of new and improved parts?—*A*. Yes. And we must make the best of what we have.

Mr. C. E. Low.—*Q*. You speak of the cotton and ginning factories. Are there too many of these yet?—*A*. Not too many.

Q. Do you know what happens in other parts of the country where there are too many ginning factories?—*A*. I do not know.

Q. I can tell you in Berar and Khandesh, where if they get a dozen gins in one place they make a combine and six of them work while the rest will be idle but share the profits. Have you any signs of that among these rice mills?—*A*. That is the case with regard to cotton presses in the Kistna district. They form into a ring and whether they work or not they share the profits.

Q. Because there is not enough work for all of them?—*A*. Yes.

Q. That is a waste of money and what do you think is the solution of it?—*A*. It is a waste of money. Why should they build a factory to keep it idle.

Q. Can you suggest any solution?—*A*. To combine some other industry that will pay.

Q. The point that you make about combining some of these mills with oil mills to improve their efficiency and increase their profits is a thing that may be taken into consideration. Don't you think it points to the necessity of looking at the thing from a broad point of view and on general and economic grounds before you start anything of the kind?—*A*. I have suggested two remedies, alternative industries and auxiliary industries.

Q. That is postpone the difficulty?—*A*. Some day or other it will have to be tackled with and what is the use of postponing it?

Q. If it is postponed for 20 years and the man goes on making 5 per cent for 20 years so much to the good?—*A*. No. Coming back to rice mills. It is not my point that the tiger should devour the cat. The cat must be strengthened and the tiger also in its own way—I mean, for cats to fight against the other cats, and the tiger to fight against the other tigers.

Q. The danger of the college of commerce is that the man who comes out of it will expect to be given a post of responsibility at too early a date?—*A*. When they are not able to get what they desire they will have to submit to what they can get. Now we can get a graduate for Rs. 15 or 20 though sometimes before graduates were aspiring to appointments carrying Rs. 40 and 50.

Q. But it will give rise to a good deal of discontent which will be rightly or wrongly directed against the Government. Don't you think that it will be a good thing to arrange for a certain amount of technical training afterwards to be given by some firms or people who agree to take them?—*A*. Yes.

Q. Because they have an exaggerated idea of themselves and that idea is rudely shaken when they come round and apply for jobs and you get discontented men?—*A*. When they depend entirely upon service that will be the case. But most people might like to have their own business. Seeking employment is the only way now and that is the danger. But that would not be the only way when they are equipped with the necessary and suitable knowledge for business. There is absolutely no institution at present from which we can recruit managers or clerks or the staff required for a firm.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. You want the Government to start a pioneer rice factory?—*A*. Demonstration factory.

Q. How is the Government to show whether it will be commercially successful or not?—*A*. They must work and show it to the people.

Q. After 50 years of rice mills in this presidency are not the people able to start profitable rice mills in the country?—*A*. That is the real state of things.

Q. Is that a thing to be taken up as a pioneer industry?—*A*. When individuals start concerns of their own accord they won't allow other people to look into them.

Q. What does a rice mill cost?—*A*. It ranges very widely. A well-equipped mill of medium capacity would cost about a lakh to fifty thousand rupees.

Q. And some individuals have their own syndicate and start their facteries and they are not limited concerns?—*A*. They are private concerns and they close inspection against other people.

Q. Is there any factory in the world which people are allowed to inspect and criticise?—*A*. It is not for criticism but for learning.

Q. The factory is not a school where to learn and the factory people have their own secrets?—*A*. Yes.

Q. Do you think that when you know some process by which you can make a profit you will allow other people to come and learn?—*A*. No.

Q. How are you going to remedy that? The people have not learnt to work it satisfactorily even after 50 years. Supposing the Government starts a demonstration factory and after three years the whole invention changes and a new model comes from England or America or Japan, then the people will blame Government for having introduced a process which becomes obsolete?—*A.* Demonstration factory is not the only way that I have suggested, but also expert advice.

Hon'ble Pandit M. M. Malaviya.—*Q.* Do you think in a case like that the people will blame Government if a new invention is made or a better machinery is produced—do you think Government will be blamed for having recommended the use of the machinery which was considered to be the best at the time that it was recommended?—*A.* No. If Government had studied the problem and recommended the machinery to the people, the people would not certainly blame the Government.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Don't you think that private people who have been 50 years in the concern can do better than Government?—*A.* Almost all the machinery is got from foreign countries and our people have no knowledge of what is going on in the foreign countries. Government can get information through its own experts and it is not possible at all for people to know about improvements that are being constantly introduced into rice mills in foreign firms unless this kind of demonstration is introduced. What improvements are being invented at home, the Department of Industries may study and advise people and demonstrate the results of these inventions. I would even say that the Department of Industries when recommending these rice mills never cared to study anything about them.

Q. There ought to be Government experts?—*A.* Yes, because they have no rice miller on their staff.

Q. You want a factory showing a series of up-to-date improvements—a factory which would show continuously the latest improvements as they occur?—*A.* Yes.

Q. Everything new added on to it and demonstrated?—*A.* New improvements like "Shule separator."

Q. Where would you put up this mill?—*A.* In some central place where people can go and see. In the Kistna, Gōdāvari and Cauvery deltas, in some suitable centre.

Q. You speak about some factory which you erected and in which you engaged a man on Rs. 250 and you say that he was a mechanical engineer well versed in the construction of cotton mills and cotton presses. Do you think that cotton mills were constructed by engineers drawing Rs. 250 a month?—*A.* Not that. When he failed to construct a rice mill we just made enquiries in Bombay what knowledge the man had. In the written evidence I am talking of cotton presses only and not cotton mills and the words "cotton mills" should be cut out.

Q. You don't get a plan from the makers of machinery of the kind of building you need when they supply you machinery. Don't they give you a plan of the building?—*A.* People don't import rice machinery. They make it here because they find it cheaper to make it here. They get them cast in Madras and they get all the parts piecemeal.

Q. And then you speak about the cement factory. Do you know that there are two cement factories working in India very successfully?—*A.* Yes. Katni Cement Works and Madras Portland Cement Works.

Q. We started a syndicate putting in five or six lakhs of rupees and tried and risked money and got men and we made experiments and after an expenditure of five or six lakhs, finding that it was successful we started this concern. A cement concern will never be a success unless 25 or 30 lakhs are invested in it. Do you want Government to start a big factory as an experiment?—*A.* No.

Q. What is the Government to do to start a factory with 30 lakhs? The Bombay people started in the United Provinces this factory and you can do the same?—*A.* I do not want Government to start a factory on its own account. There is a great desire on the part of many enterprising men and capitalists to start a factory for the manufacture of this material at a convenient centre and a joint stock company can readily be floated provided the Government will give its co-operation by the grant of a few acres of land in a suitable place free of rent and by obtaining the necessary machinery and plant from home, and by securing the necessary expert advice and information. More help than this is not necessary.

Q. Why do you want all these? There are factories here. You know what we have done and you can do the same. I am afraid that if the Government comes in they may not prove more successful than private people?—*A.* Government may get information from those firms.

Q. You are free to apply to hundreds of people and you can send your men there to enquire?—*A.* You yourself admitted that they are right in shutting out people from knowing their work.

Q. We had our difficulties and we had no cement company before here?—*A.* It might be that a particular individual achieved success in a particular manner in a particular industry but that is no good to my purpose.

Q. We asked our makers to give us different kinds of machinery and we got from Germany experts and paid them all at our own risk. Supposing you started this company and Government got you machinery and everything and supposing the enterprise was not a success, don't you think that it would place Government in an awkward position?—*A.* Government could get it from reliable firms and the firms would give proper machinery.

Q. Are not private people better able to judge and find out these things than Government agency? What is your experience about it?—*A.* Government may be able to get proper machinery. If the machinery is not proper and if it is ill-suited we cannot take any risk and we want Government to help us a little.

Q. According to your proposal there is already some risk. If the machinery is not good you are the sufferer and nobody else?—*A.* It is why we want Government to help us.

Q. You want the Director of Industries to have executive power under local Government?—*A.* Yes.

Q. And you want an advisory body to advise him. Should it work under him or under the Government?—*A.* Under the Government. The Director and the Advisory body should work in harmony.

Q. Suppose they differ?—*A.* If there is a serious difference they can refer the matter for settlement by Government.

Q. Do you know anything about the Bombay College of Commerce and its curriculum?—*A.* When I had been to Bombay two years ago I saw it.

Q. Do you think it needs modification?—*A.* I don't know the curriculum thoroughly, if management, business constitution and organization, etc., are included in the curriculum.

Q. Do you think if a college of commerce is started in Madras it will be sought by people?—*A.* Yes.

Q. You want a college of commerce here?—*A.* Yes. Mr. Thiagaraya Chetti said that the time is not ripe, but I think that a college of commerce in this presidency is over due. Even for the existing concerns there is scarcity of qualified men to take up appointments.

Q. And for starting these concerns you want also an industrial bank?—*A.* We do require it.

Q. What part should Government play in financing these concerns?—*A.* Government may advance loans on concerns that have proved their fitness to receive loans at a low rate of interest.

Q. What about this provincial industrial bank? Whose capital must it be? Is it Government's or people's money, or should Government guarantee interest?—*A.* Government may put in half the capital and for the rest they may call for shares from the people.

Q. And should Government guarantee interest?—*A.* They must guarantee debentures.

Q. And the money of these banks must be given through the advice of the Advisory Board and the Director of Industries?—*A.* Yes.

Q. Do you think that industries will take up this money here or will the money be lying idle?—*A.* They will take it.

Sir F. H. Stewart.—*Q.* You say "I know that the Department of Industries charged a fee to give and repeat the same advice to persons that have sought its advice for constructing rice mills." Do you mean to say that you object to their taking a fee?—*A.* I don't object to their taking a fee, but they took fee and did not give the very best advice that could be given and they never knew what they ought to know.

Q. In the districts to which you refer, what are the cotton, ginning and rice milling seasons?—*A.* Rice season succeeds cotton ginning season. Cotton ginning season begins from April and goes up to August. Sometimes it may commence in March too. There are two seasons for rice. The rice mill starts in January and works until March or April and then it gets dull for a few months. If it gets dull it gets dull for the whole year or sometimes it revives in the month of August.

Q. I am not quite clear about your proposals about the Director of Industries. You say he should have executive power and budgetted funds. Do you mean that he should have a certain amount of money placed at his disposal each year and when proposals are put before him if he carries the Advisory Board with him, he can give the people who come any amount of money within this budget?—*A.* To the industries or to the people as the case may be.

Q. He must give under the direction of the local Government and not of his own authority?—*A.* It is not for loans. It is for the improvement of industries.

Q. You are going to give the Director of Industries large powers?—*A.* The Director of Industries in expending money will take the advice of the Advisory Board. When once the funds are placed at his disposal by the Government he should be given a free hand to deal with the funds with the advice of the Advisory Board.

Q. If they agree with him he need not refer to Government any more?—*A*. No.

Q. You think that that would be a sufficient restriction to place on the expenditure of public money?—*A*. Yes. Because it consists of an Advisory body and a responsible Director of Industries, I think more control than that is not necessary.

Mr. A. Chatterton.—*Q*. You said that the Department of Industries took fees in matters relating to erection of mills and factories and so forth. Do you know how the charge was made?—*A*. Rupees 10 with each application and 2¼ per cent for the cost of construction.

Q. You said the Department of Industries gave bad advice?—*A*. Not that it believed to be bad. It never had a proper expert on its staff—that is, a rice milling expert. The department did not do anything more than what people would have done themselves if left alone.

Q. Are there any rice milling experts available in the presidency?—*A*. They are generally imported from Rangoon.

Q. As an alternative to going to the Department of Industries, whom would you advise people to go to?—*A*. They could have sent one supervisor to Rangoon and got him trained.

Q. You have got a lot of incorrect information?—*A*. It is the best of my information I did make enquiries as regards rice and there were no experts.

Q. Did you apply to the Director of Industries to know if he had got properly trained experts or whether he had himself got an expert knowledge in the matter?—*A*. Since I know that he did not have such staff I did not think it necessary. I did talk to him about this rice milling and from us he wanted a fee. Our firm paid also consultation fee for rice milling and some advice we got.

Q. How long ago was that?—*A*. After you left the department. It is just two years ago.

Hon'ble Pandit M. M. Malaviya.—*Q*. How long have you been a rice mill owner?—*A*. Since 1900.

Q. Do you carry on your businiess of rice milling in one district only?—*A*. In all the districts and we export.

Q. You say "In the working of most of these mills economy and efficiency are not at all observed as the machinery is handled by men who do not know their work and who have not had any training for it." You have not made any suggestion for the training of these men?—*A*. No. We must have workshops and industrial schools for training these men.

Q. Do you think that the failure of these mills is due largely to the lack of expert advice and demonstration factories?—*A*. Yes. The failure is due to the want of expert advice and the remedy is a demonstration factory.

Q. You want a demonstration factory to be equipped with the most up-to-date machinery and to supply information to all those engaged in the industry for their benefit?—*A*. Yes. They may also issue bulletins regarding improvements that have been effected.

Q. In fact you want the demonstration factory, also to be a bureau of information for the industry?—*A*. Yes.

Q. You think that such a demonstration factory will keep up a supply of up-to-date information and there will be no opportunity for the public to find fault with the Government for any changes that may be effected?—*A*. Surely not. After all Government also consists of human beings and there might be failures.

Q. You say here with regard to the Department of Industries that it contains neither experts nor business men but only men of the Public Works Department. Is the present Director of Industries here a gentleman belonging to the Public Works Department?—*A*. He is a civilian. I am talking of the supervisors—I mean men who are assisting the present Director of Industries.

Q. You say that it is desirable that the Director of Industries and the experts should be Indians as far as practicable. Assuming that you cannot get experts among Indians in the present stage of our industrial progress, have you any alternative suggestion to make to associate Indians with the department?—*A*. You can have Europeans associated with Indians as well. And that is why I say as far as practicable.

Q. But you want Indians to be associated with the Director of Industries because in your opinion it would facilitate easy exchange of views and intercourse with their countrymen and the easy running of the department at a comparatively low cost?—*A*. If possible I want the Director of Industries to be an Indian.

Q. But in case you cannot get a qualified Indian at present?—*A*. Surely we can have an European associated with Indians. I suggest it, because it would facilitate easy intercourse and an Indian would work at a lower salary.

Q. Do you think you will find Indian business men of position and reputation willing to take up such a post? Do you think you have got a sufficient number of Indians with reputation and position from among whom a choice can be made?—*A*. It is rather a difficult question to answer, but just as people are taking to public service, people may be willing in the interests of the country to take up this service though it may not pay them.

Q. You think that on grounds of public interest Indian business men might be willing to take it up even though it may not be worth their while to take it for the salary attaching to the post?—*A.* Yes.

Q. You think you need a college of commerce to supply the needs of the existing institutions?—*A.* Yes.

Q. For instance, to train managers of banks, assistant managers, accountants and auditors?—*A.* Yes. The business of the province is increasing and it is passing into the hands of Indians. So far as European firms are concerned they could import managers and other competent staff from England, but Indians are quite disabled for want of proper staff, because there is no institution to train them, and for want of this, business is very greatly suffering.

Q. Apart from the question of manufacturing industries, in view of the large export and import trade of the country, you think there is need for a college of commerce to train men to go into commerce and to take a larger share in it than they do at present?—*A.* Yes, and to help the existing industries.

Q. And to develop business?—*A.* Yes, and to make them work successfully against Indo-European competitors.

Q. As regards the provincial industrial bank, you want that it should have branches in important suitable centres and you have suggested that Government should subscribe half the capital. Supposing that Government put in less than half the capital don't you think that the public will still subscribe to the funds of the bank?—*A.* It will, but if it were half it would induce greater confidence in the people and the rest of the capital would be more easily flowing.

Q. Will the amount of capital subscribed by the Government determine the measure of confidence which will be inspired or will the mere fact of Government putting in some money inspire confidence?—*A.* There should be both, because if the Government puts in half the capital that will be a sure guarantee to the people that it will be prosperous and that they will not lose their money. Otherwise they would say that Government have put in only a nominal capital. I want half the capital to be subscribed by the Government just to inspire more confidence in the people.

Q. What percentage of interest would you wish Government to guarantee?—*A.* The rate of interest in India and especially in this province is very high. Locally they can get not less than 12 per cent. Government may guarantee 5 per cent and it will be a reasonable rate.

Q. In case Government helps such a bank to come into existence, do you think there will be much need left for Government to lend money direct to industries, or do you think that such a bank will finance industries?—*A.* Such a bank will finance industries fairly well.

Q. And the need for Government lending money directly will be avoided?—*A.* Yes, or at least it will be minimised.

Q. Did you mean to suggest that a graduate from a college of commerce should be put in charge of business as soon as he got out of the college, or did you mean that he should receive some practical training after graduating in the college before he was put in charge as manager?—*A.* My view is this. He will be the common stock of all people and the people may take him and just train him for the business for which he is found suitable.

Q. You don't contemplate that he should be put in charge all at once as manager?—*A.* He will serve only as a raw material to be shaped.

Q. As Mr. Low has said, he will start with the great advantage of having received the education that he has received and in the end he will prove much more useful than a man who has not had that training?—*A.* The training that he will receive subsequently will be special and the training that he will receive in the college of commerce will be general.

Q. Apart from the system of education and assistance in financing that you have suggested, do you think that a bureau of information which would supply information regarding industries and the possibilities of industrial development would be helpful in promoting business?—*A.* It is very badly needed.

Q. Do you think these bulletins should be published in English and in the vernaculars also?—*A.* In English and in all the important vernaculars of the presidency.

Q. From your experience, could you say that the desire for going into industrial enterprise is growing among educated Indians?—*A.* It is growing. It is not so much among the educated Indians, but in the country it is growing.

Q. And can you also say from your experience whether the prejudice against men of high caste taking to industrial pursuits involving manual labour is diminishing?—*A.* It is diminishing. So long as the industries prove profitable they don't care for that.

WITNESS No. 209.

DR. J. L. SIMONSEN, *Professor of Chemistry, the Presidency College, Madras.*

* WRITTEN EVIDENCE.

Technical and scientific departments.

With the exception of the Department of Agriculture, there can hardly be said to be any organisation in this presidency correlating the work of the scientific and industrial departments. Under the Department of Industries there are three experts, in dyeing, tanning and oils. With the exception of the oil expert, who is in charge of a soap factory on the West coast, I doubt if the work done by the experts has proved of much importance to the industries with which they are concerned. One of the main reasons for this has been, in my opinion, the fact that no laboratory accommodation has been provided, so that the experts have been unable to carry out the necessary researches which might have led to improvements. I deal below with the changes which I consider would improve the organisation of technical research.

Imperial Research Department of Chemistry.

Q. 64 *to* 70.—I am not of the opinion that the appointment of experts in various subjects by the local Governments can ever prove thoroughly satisfactory. A man of proved ability is unlikely to desire to come to India for a short period except at a very high rate of pay as he would get out of touch with his work at home, and further it is doubtful if a man of middle age could stand the climatic conditions.

In so far as chemistry is concerned and the industries mainly influenced by chemical research, I wish to strongly support the scheme that has been suggested, I believe by Sir T. H. Holland, a scheme in general similar to that adopted by the Government of Australia.

A Department of Chemistry under the direction and control of a Chief Chemist should be instituted.

Functions of the Department.—The functions of the department should in general be the following:—

(i) To investigate on behalf of the Imperial and Local Governments any problems that may lead to industrial development.

(ii) To provide experts in various subjects whose services may be placed at the disposal of the Local Governments for the solution of problems which can only be attacked on the spot.

(iii) To staff the professorial posts in the Government Colleges.

(iv) To investigate problems for private firms.

(v) To standardise apparatus and analyse materials in the manner of the National Physical Laboratory.

It will perhaps be advisable to point out a few of the advantages which I consider would accrue from the establishment of such a department—

(*a*) It has to be realised that chemistry is one of the most specialised of all subjects and that there is, for example, a greater gulf between some portions of chemistry than there is between chemistry and physiology. It is therefore essential that a man filling a particular post shall be a specialist exactly suited to that post. Now it is clear that Local Governments could not afford to employ such a number of specialists as they might only be required for a very limited period. It would, however, be possible for the Imperial Government to employ such specialists and to place their services at the disposal of the Local Governments.

(*b*) Under this scheme the University Colleges in India would be very much more efficiently staffed since it would be possible for the Imperial Service to maintain a "leave reserve" which is at present impossible in the case of the Local Governments and very often leads to the appointment of inferior men whilst the holder of the post is on leave. This is neither fair to the man appointed nor to the students. Further the fact that the chemist belonged to the Imperial Service, where promotion would be, in part, by merit (see below) would be an incentive to do research which is at present lacking and once a real research atmosphere is created in the colleges there may be some hope for the future development of higher education and its consequent effect on industrial progress.

(*c*) The main research work of the department would be conducted in a central laboratory (see below) and the men would therefore work under all the advantages that accrue from the possibility of discussion and collaboration. The importance of this can best be appreciated by those who have worked in a large research laboratory and have attempted to continue their work in this country in the isolation that usually obtains.

(*d*) As is obvious, men are occasionally appointed as chemists who subsequently show themselves unsuited for their posts for a variety of reasons. As is well-known, in such cases it is practically impossible to get the man dismissed and the department to which he has been appointed is likely to be inefficient for the remainder of the man's service. This difficulty would be much lessened under the new scheme as routine work in the main laboratory could always be found and in many cases, the man might do excellent work when not in independent charge.

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* See also additional written evidence printed after oral evidence.

Head of the department and staff.—The Department of Chemistry would be under the direct executive control of the Chief Chemist. The Chief Chemist should be a man who had already shown himself capable of original investigation, a good administrator and man of affairs. He should be allowed very full powers in his own department in initiating the lines of research both in pure and applied chemistry and should be solely responsible for the deputing of his assistants to particular posts. These assistants whether loaned to Local Governments or working in the central laboratory should be under the direct control of the Chief Chemist.

The satisfactory recruitment of the staff is likely to offer considerable difficulty. I am opposed as a general rule to the recruitment of men over 33 years of age, because I do not consider that such men adapt themselves well to Indian conditions. The men appointed should be graduates with an Honours degree in Chemistry (or its equivalent) who have had some three or four years experience of research and who, in the opinion of the person with whom they have worked, show promise of ability to originate and carry out research. The main qualification should be ability to do research. It will be necessary to appoint men who have been trained in the multifarious branches of pure and applied chemistry so that the staff will of necessity be large. I am of opinion that the pay should be Rs. 500 rising by annual increments of Rs. 50 to Rs. 1,000, the promotion to higher grades of the service, Rs. 2,000 to be by merit. There would also be a *pro rata* share in the proceeds from technical work (see below). The pay of the Chief Chemist should be Rs. 3,000.

Location of the central laboratory.—The work of the Department of Chemistry would be carried out in a well equipped central laboratory. In my opinion such a laboratory should be located near either Calcutta or Bombay in the centre of the main industrial area. From personal experience I have observed that the most satisfactory work is as a rule produced in a place where the population as a whole is a working population. Although for climatic reasons it might at first sight appear, that a hill station or semi hill station, such as Bangalore, would be more suitable, I very much doubt if such would really prove to be the case. (I consider that a hot weather vacation is essential to men engaged in research work).

In considering the question of location, it is, of course, necessary to consider the question of such institutions as the Indian Institute of Science at Bangalore. At first thoughts one is naturally much tempted to make this institution the nucleus of the new laboratory. Although doubtless this would possess many advantages, I am, for the reasons already given, in favour of a location near a manufacturing centre. The Indian Institute of Science would still find a large sphere of activity.

I do not consider that in the majority of cases local research institutions would be necessary. It will be possible to work out the details of the research very thoroughly at the central laboratory and only the large scale operations would need to be done on the spot. I recognise that this does not apply in the case of many agricultural problems where local conditions are all important. Further the establishment of local laboratories would greatly increase the cost of the department with the duplication of libraries, staff, etc.

Work of the department.—The normal work of the department would be in investigating for the Imperial and Local Governments problems that might lead to future industrial development and the consequent pure research arising therefrom. The results of such work and also the patent rights would be placed by the Government at the disposal of firms who may desire to develop the particular industry.

Another important branch of the activities of the department would be the solution of problems brought to them by firms already engaged in an industry. Such services should not be gratuitous, since if they were it would completely ruin the practices of private analysts and consulting chemists. The rate charged would depend on the nature of the work done and the patent rights, if any, would be the property of the firm. (I am of opinion that the department should be permitted to publish in the ordinary journals such portions of the work as may from time to time prove suitable).

I consider that the fees paid to Government for advice on technical problems and the opening up of new lines of industrial development should be divided *pro rata* amongst the officers of the department, as this would give an added incentive to work. My reasons for suggesting a *pro rata* division are the following:—

(1) If the fees were to be paid to the man or the men concerned it would place a large premium on applied as opposed to pure science. This could not but prove injurious since pure science is the basis from which applied science develops.

(2) The solution of problem might be due to the work of several men and it would be difficult to divide the fees amongst them.

(3) Unless a *pro rata* division is made there is likely to be considerable difficulty in running the department and it would render the allotment of the researches by the Chief Chemist a matter of great difficulty.

(It has always seemed to me that the present rules of Government forbidding officers to undertake private work has had a bad effect. In advising technical firms the chemist is continually brought face to face with new problems for research and further he is put into a position in which he can find posts for his students. I am fully aware that there is a great danger of evils arising out of the professor being permitted to do private work but I am of opinion that the advantages outweigh the disadvantages.)

Co-ordination of research.

Qs. 74 *to* 76.—The question of the co-ordination of research is of very great importance. By the establishment of a Department of Chemistry it is clear that all the chemical research whether pure or applied (in Government institutions) would be under the control of the Chief Chemist and there would be no danger of overlapping. In co-ordinating research it will be necessary carefully to avoid the danger of stifling initiative and originality by attempting to dictate to the men doing research the type of work they are to do and the problems they are to attack. The choice of problems should as far as possible, be left to the man himself.

The correlation of the work of the various Government Departments might well be undertaken by the Board of Scientific Advice of which the Chief Chemist would naturally be a member.

It is somewhat early, at present, to judge of the effects of the Science Congress. The Congress was started with the objects of encouraging research, popularising science and enabling men who were working on the same or cognate subjects to discuss them formally and informally. To judge by the number of persons attending the Congress and also by the number of papers contributed, it would appear to be fulfilling its functions. Speaking personally I feel that I have been much benefited by attending its meetings and that it has in many ways refreshed my outlook on my subject.

That the Congress is capable of development and improvement in many ways is obvious. It has been our idea so far as possible to keep free from official control so that in any problem that might arise the Congress would be able to take independent action and to offer an unbiassed opinion. When funds become available it is hoped to be able to allot them to Committees to carry out research and in this way it may be possible to aid industrial development. It might in the future also play an important part in the co-ordination of research and be the connecting link between research in this country and the Advisory Council in England.

Study leave.

Q. 77.—Every possible facility should be given to officers to avail themselves of study leave as otherwise they are very likely to get out of touch with the most recent developments. This is especially likely to prove the case with men engaged in technical research where the literature generally conceals more than it reveals. Such leave should be granted on the recommendation of the Chief Chemist and should not entail loss of pay or pension.

Libraries.

Qs. 78 *and* 79.—Personally I cannot say I have suffered from want of libraries. The chemical library in Madras is fairly good and with the expenditure of a comparatively small sum could be made complete for all practical purposes. That I have not suffered from its deficiencies is due to the excellent library at the Indian Institute of Science, Bangalore, from which copies of papers can be obtained.

In my opinion it should be the aim of Government to establish in each Presidency a first class reference library. I do not consider that the books of reference or journals should be loaned but arrangements might be made to supply copies of papers at nominal fees.

What is extremely badly needed is a catalogue of the reference books and journals available in India, the place where they are available and the conditions under which they can be consulted or borrowed. I think such a catalogue would be of very great value and would do much to help research men in their difficulties.

ORAL EVIDENCE, 24TH JANUARY 1917.

President.—*Q.* I think that all my colleagues will thank you for your interesting note. In too many of the cases that we have had witnesses have obscured and masked such of their views as are based upon special experience by generally a heavy foliage of vague and general impressions. Our chances of picking out the good suggestions from the bad are so few owing to the thick draught of chaff with which the former were covered that we were retarded in our attempts to devise practical schemes for industrial development. We are therefore much indebted to you for confining your evidence to the immediate and practical question of adapting your own subject to the requirements of indigenous industrial enterprise. It is therefore a great pleasure to meet a man of science who is also a scientific man. I have only got one or two questions by way of supplementing your note. One is with reference to the location of the central laboratory for the proposed department of chemistry. In this matter you have recognised that vested interests have to be considered and you refer to the Indian Institute at Bangalore. You suggest the establishment of one central laboratory for chemistry. Don't you think it would be advisable to recognise local and vested interests to the extent of having not one central laboratory but something like three headquarters laboratories [illegible] well-defined divisions of chemistry, for instance agricultural chemistry [illegible] natural home of [illegible] growing at Pusa. Mineral and metallurgical [illegible] no special home but Calcutta or possibly the district round the iron and steel manufacturing areas. The coal fields might also be a suitable centre for this kind of chemistry. And then there is the organic chemistry dealing with the chemistry of drugs and various products of all sorts. And for this a suitable home might possibly be found in Dehra Dun where they are having a big library and also a laboratory. In a case of this kind I should like to know whether in your opinion that much separation would result in reduced efficiency having regard at the same time to the local colour and the local atmosphere and taking also into consideration the established vested interests which one does not like to disturb without good and sufficient reasons?—*A*. I think it would be disadvantageous to separate them in the way you suggest. One of the difficulties at present is that a person working on a subject is not able to collaborate with men working at his own subject but also in cognate subjects. You will find difficulty in spreading knowledge in so many distant centres. For instance a man working at Electricity might require the help of a Physics man who may not be available in the place where he was working. I mention that only as a small point. I think it would be disadvantageous to have separate laboratories in separate places.

Q. That is an important point worth considering now. I do not suppose there is anybody in the world who would advocate the system of appointment of chemists for instance to the Customs Service. Nobody can defend it. The chemist of the Customs Department in Calcutta has to answer authoritatively questions put to him by Customs officers who are quite unaware of the fact that they cannot deal authoritatively with all the subjects that are referred to them, such as organic chemistry, inorganic chemistry, the chemistry of various industries. The man in such a position tries to do his best and knows very well that it will only create misunderstanding if he were to say that all these different questions ought not to be answered by the same man. His superior officer is very likely to misunderstand. You think that we ought to try for perfection and go to the other extreme and concentrate all our activities in one centre?—*A*. That is my view.

Q. Would it not be possible to have a sufficient community of chemists, for example, the mineral and metallurgical chemists in one area and the agricultural chemists in another and so on. Would that not meet the purposes of the questions that you have raised?—*A*. The question of organic and the inorganic chemistry raises a very big question. I think it will duplicate machinery to a certain extent.

Q. Of course one has to consider the relative merits of duplication and the relative costs of duplication. On the whole which would you prefer?—*A*. Personally I think that the central laboratory would be the most advisable.

Dr. E. Hopkinson.—*Q*. Do you consider it necessary to differentiate between the organic chemist and the agricultural chemist? Is not there a broad division between organic chemistry and inorganic chemistry? Is it necessary to subdivide?—*A*. I think there is more relation between the agricultural chemist and the inorganic chemist than there is between the organic chemist and the agricultural chemist.

Q. What division would you classify chemists into?—*A*. I should not like to attempt that.

Q. Whatever they do will they not overlap?—*A*. You cannot differentiate. They are divided simply for convenience from a teaching point of view. You may say that you can divide. But there is no real division. To do original work on any subject the man would have to be thoroughly trained in that particular branch.

President.—*Q*. In any case it is a matter of compromise?—*A*. It is bound to be.

Q. What sort of compromise would best suit the conditions that you regard would suit the British temperament and its love of vested interest?—*A*. It is bound to be a compromise. You cannot make it perfect.

Q. There is one other point also which I want to know if you have considered. If you place the central laboratory in any place it must be influenced by the local colour. For instance the Geological Survey is at Calcutta. Consequently Calcutta is likely to have more vested interests in the work than any other presidency. You cannot divide a small thing like the Geological Survey into three. What do you think about it?—*A*. I think it will be advantageous to have all the men together provided the head of the department toured and visited other provinces and got a knowledge of the problems.

Q. Your proposal may be good from the scientific point of view but from the administrative point of view there may be difficulties. Considering the size of India and the great variations in the local colour do you think that compromise is possible? I am merely trying to find out your views?—*A*. I have not considered the question from the commercial side. Personally I should like to see all the laboratories in one place. Any practical difficulties might outweigh that consideration.

Q. You say that every possible facility should be given to officers to avail themselves of study leave, that such leave should be granted on the recommendation of the Chief Chemist and that such leave should not entail loss of pay or pension. Do you know that a system of study leave has been introduced into the Geological Department? There the study leave counts for pension and promotion and for increment of pay so that it practically counts for service in all respects. Have you any study leave of this kind?—*A*. At present we have no study leave at all. A man might be put on deputation. That is the only chance he has.

Q. Do you think that it ought to be extended in any case?—*A*. I do think so certainly.

Q. As a scientific officer of the Education department I suppose you are alone as a chemist?—*A*. I have a colleague who does the inorganic side.

Q. When you go on leave who takes your place?—*A*. There is a difficulty at present. For instance my colleague Mr. Erlam Smith went on leave and they had to bring in an Inspector of Schools who had not been in touch with chemistry for eight years and it was a very difficult matter indeed for him to undertake the work.

Q. Do you think it would have been better if your service had been more mobile and if you could get chemist from other provinces?—*A*. Certainly I think so.

Q. That is one of your reasons for advocating that the chemical departments should act as a reservoir also for the professional staff?—*A*. Yes. I think so.

Q. I suppose getting professors from a central department like this would be desirable also from the educational point of view?—*A*. It would be excellent. It would add a tremendous incentive to the department.

Q. Especially because these men would in the course of their official career be engaged in the study of industrial problems?—*A*. Yes.

Q. You have mentioned the question of the publications of the department. Do you think it would be advisable that the results obtained by the department should be published in some official bulletin or journal the subjects being divided in appropriate groups?—*A*. I very much doubt if that is essential.

Q. How are you going to develop the spirit of pride in the department unless there is one journal which will be authoritative for chemistry throughout India?—*A*. I think it is much better done in the recognised journals at home.

Q. What then about the prestige of your department?—*A*. They may republish the articles locally at the end of the year.

Q. Why not make this the normal field of publication?—*A*. Because I doubt very much if that would attract much attention unless it had a good status.

Q. You will never establish a status unless you first start the thing?—*A*. I think the home journals are a good field for publication.

Q. If the department had a journal of its own and everything of value appeared in it, it would then be recognised as the official chemical publication in India?—*A*. I think it would certainly. I have no objection to such a thing in the least.

Q. What I want to know is whether it would be an advantage?—*A*. I do not think so personally. I do not see that there is much advantage in it. If the local papers also publish the articles, that would confer the status on the department.

Q. In the Geological Survey the publication of records is done in a very thorough fashion. They are indexed and serially numbered from the very first volume so that any geological society in the world may read them and take advantage of them. By taking these records one gets an idea of the whole range of geology in India. The other societies are bound to recognise the department in that way by the exchange of periodicals. Don't you think that is an advantage?—*A*. From that point of view it is of course excellent. I was not looking at it from the exchange point of view.

Q. The exchange system is of importance in this way that if the journal is a valuable one it is bound to be recognised by every library of importance in the world and the publication then becomes as effective as any of the English journals?—*A*. In some of the home laboratories they publish the papers in any suitable journal and then they republish them in serial papers themselves and send it to anybody who asks for them. That practically comes to the same thing.

Q. Don't you think then that if something like what they do in the Geological Department were done in the case of chemistry it would be useful?—*A*. In geology all your problems are more or less Indian in the main. In chemistry they would not be.

Q. Most of them will be?—*A*. Not exactly if they are going to deal with the raw material.

Q. You do not think then that this question of establishing the prestige of your department is of sufficient importance to counterbalance the advantage of publishing in an established journal at home?—*A*. I do not think so.

Q. If such a journal were published here, you will make the man feel that he is proud of belonging to the chemical department and from the point of view of the Government the matter is worth a good deal. It means a great deal with regard to the quality of the work done and also the fact that the man while he is on leave would be thinking of his own Indian problems and the necessities of his department?—*A*. I quite agree with you there.

Q. There has been another proposal put before us that we should like your opinion on. It is sometimes difficult to recruit for the Indian department many of the promising men at home. They prefer to remain at home and they think that they would become President of the Royal Society. Men of that kind would not always book themselves for a full service. They might consider the possibility of coming out for a short while. Do you think that recruiting would be facilitated if there was a system of appointment of the Assistant Lecturer and Demonstrator class who could obtain scholarships for research in India for two or three years. In the case of the Forests, Geology and subjects that are dependent on raw materials in the country there might be some attraction to come out and do research work. Would it be possible to attract men of this kind for a central chemical department in the country?—*A*. I do not think so.

Q. Don't you think they would accept these fellowships and come out?—*A*. They prefer to stay at home.

Q. Do you think that they would rather book themselves for a full service?—*A*. Most of them now come out on a two years' agreement. After which period they can return or be sent back.

Q. Does that discourage the men?—*A*. Not in the least.

Q. Some candidates have told me that they would not like to go out on probation and be returned as failures?—*A*. I have never known anybody who has returned.

Q. Don't you think that a good number of men ought to be?—*A*. I would not care to answer that.

Sir F. H. Stewart.—*Q*. You are a member of the Indian Educational Service?—*A*. Yes.

Q. From what you have said to the President I understand that you are in favour of the location of the laboratory at some central place?—*A*. Yes.

Q. You say that you would like to have it near some big manufacturing centre. Have you any suggestions about that?—*A*. I should like Bombay or Calcutta or any other big manufacturing centre.

Q. You still hold to your opinion of having one rather than three?—*A*. Yes.

Q. With reference to private work your idea is that chemists should be allowed to undertake private work?—*A*. Not if they are working in the central laboratory, unless they were allowed to do so by the head of the department. If they were working in a college on their own account then they may be allowed to do private work.

Mr. C. E. Low.—*Q*. Is your work teaching and the control of teaching or is it also research?—*A*. I do research in the ordinary way.

Q. More or less on your own initiative?—*A*. Yes.

Q. Have you got any research students?—*A*. I have got one at present.

Q. Is he doing post graduate study?—*A*. He is an Honours graduate, holding a University studentship. He is in the second year of his studentship.

Q. How many of these research students in chemistry are there?—*A*. I think eight for all subjects including chemistry a year. The studentships are granted by the University.

Q. Is there any seminar work for the M.Sc.?—*A*. We have not got the M.Sc. course. We have an Honours course which corresponds to that.

Q. Your subject is now mainly education and not chemistry?—*A*. I suppose it is really so.

Q. About laboratories do you know what the dyeing expert and the tanning expert are doing?—*A*. The tanning man has no laboratory. Dr. Marsden did some work at Bangalore. Mr. Guthrie is on active service.

Q. Do you think it would be an advantage if all the chemists belonged to a central department of chemical service and their services were availed of from time to time?—*A*. Yes.

Q. What would be the form of control?—*A*. They would have to be under the head of the chemical department.

Q. Can you parallel it with any other Government service which you know of?—*A*. I do not think so. The only instance would be the Professor of Geology being loaned to the Presidency College by the Geological service.

Q. With reference to research work you say that in co-ordinating research work it will be necessary carefully to avoid the danger of stifling initiative and originality by attempting to dictate to the men doing research and the problems they have to tackle. There is a lot of human nature in this business. Do you think that friction is likely to arise if the Chief Chemist wanted to do a certain piece of research work in a college and the college authorities thought that the matter trenched on their sphere too much?—*A*. I do not think so. At any rate in the bigger colleges, such as the Presidency College, there is ample time for any man who wants to do research work. I do not think the teaching in my department encroaches on research work.

Q. That has not been the experience in other provinces. My personal experience is in the case of the Central Provinces where the chemistry man has been complaining that he has no time for research work. He said that he had too much teaching work to do?—*A*. I cannot say the same thing here. I have ample time for research work if I want to do it, if only you want to do it earnestly.

Q. You say that the Chief Chemist should be allowed very full powers in his own department in initiating the lines of research both in pure and applied chemistry and should be able to depute his assistants to particular posts? Supposing there is a conflict of opinion between the head of the Chemical Service and the Board of Studies whose opinion would prevail?—*A*. Obviously the decision of the majority will have to stand.

Q. Don't you think that the independence of the local chemist would be much curtailed if he were entirely dependent for his orders on the Chief Chemist?—*A*. I do not think so, if you have got a reasonable man as Chief Chemist.

Q. Would the relations be advisory?—*A*. Yes.

Q. Turning now to the Agricultural Department you have got now a large and organised scientific department. It has been put to us that there is more likelihood of overlapping between the work of a chemist and a botanist in the same province than there is likely to be between a chemist in one province and a chemist in another province. It was also put to us that the agricultural chemist must have a distinct agricultural bias. That is to say to a certain extent he has to start his own problems and in order to do that he must have a fair working knowledge of the province he is serving in and of the agriculture of the province. That means a matter of very specialised experience. In such a case how would you fit the position of the provincial agricultural chemist into the central scheme?—*A*. I should consider that a man should be loaned from the central department to the provinces. He might already be there under present conditions and a man after all is only capable of attacking a certain type of problem, however good he may be. Supposing a man works in a province on certain lines and comes to fairly definite conclusions in respect of that particular matter then it would be up to the other provinces working on the same or similar lines to utilise his services.

Q. Take for instance the question of the botanist. In that case a man works for a considerable time in a certain place on, say, cotton. At present the same has been done in the case of sugar. In cases of similar problems arising in different provinces in other parts of India the man might be utilised. Would something of the same sort do in the case of chemistry?—*A*. Certainly. I think so.

Q. Would you put these men under the provincial authorities or under the Chief Chemist?—*A*. I think it is very difficult to generalise. It depends so much on the particular problem that he is attacking.

Q. There are at the present time different types of cotton to be dealt with and the question of soils varies from province to province. If there was some headquarters officer who would co-ordinate the work of all the various people would not that do?—*A*. I should think so. I think it would be distinctly advantageous.

Q. As soon as the research work is completed the work would be passed on to the local people in the same way as the results of the central laboratory at Pusa?—*A*. Yes.

Q. For instance the cotton specialist we have is now located at Poona. Sugarcane research is located at Coimbatore. Do you think that principle should be extended?—*A*. I think that would be advantageous in the case of a large number of problems. That would be cheaper.

Q. Then as regards the lines to work to be taken up would the functions of the Chief Chemist be mandatory or advisory?—*A*. I think they would be advisory to a large extent.

Q. Supposing you had a man who showed a tendency to fly off his job, quite a good man, what would you do?—*A*. If he shows more aptitude for teaching than for research then he might usefully be sent to a college.

Q. You mean handing him over to the University?—*A*. That would be more useful.

Q. In the case of a large chemical industry in Europe where there is a big staff of chemists, do you know how that sort of thing is arranged?—*A*. The only place I know is the firm of Burroughes Wellcome & Co. Their methods are perfectly simple. They give the man the problem and he carries it on.

Q. Who is to decide in such a case?—*A*. The Manager or the Chief Chemist. The general line on which the thing would be done is determined by the Chief Chemist.

Dr. E. Hopkinson.—*Q*. Assuming that a department of chemistry were established do you think that the junior ranks might be recruited from the Indian students of the Universities?—*A*. I think that is quite possible.

Q. You think that the products of the University will be suitable?—*A*. At least some will be suitable though not all.

President.—*Q*. Supposing the system of recruitment were so designed that the Indian got a fair chance of competition with the man appointed from home, do you think that we could get a large number of men?—*A*. I think the system would react very favourably on them. I think the number will increase very largely.

Q. You remember the National Physical Laboratory at home. There were a number of junior assistants there who first work as research students under direction. Would it be desirable to establish some such system in India?—*A*. I think that University research students should be sent out to do research for a year or two before they go out into the world, whatever their vocation might be.

Q. Do you agree that professors to the chairs in the Universities might be appointed from the members of the Imperial Service?—*A*. Certainly.

Dr. E. Hopkinson.—*Q.* I did not quite catch the reply that you gave regarding the payment of fees to the professors? Do you suggest that fees should be paid by Government in respect of research work?—*A.* I think that the fees might be pooled and divided among the members of the service. It would be a great incentive. A man will work better if he has got the idea that he is going to get some fees for the work that he has done.

Q. I never heard of any such system as regards Government departments?—*A.* My point is that it will act as an incentive. For commercial work you will get very much more out of the man if he thinks that he is going to be paid for the work. In Government service in the case of a salary rising by increments the man knows well that his pay is bound to increase in spite of his work, whether he does work or not. But if a system of fees were established there will be an incentive to work.

Q. Would not an adequate and steeply graded scale of pay and promotion entirely by merit provide sufficient inducement?—*A.* It is difficult to promote solely by merit. The men are working on so many different lines that it would not be possible to adopt any such system of promotion. After all it must resolve itself into a question of promotion by seniority. It is difficult for the head of a department to put a new man over a man of seniority. I know it is quite a new idea, namely of Government servants getting paid for work done but all the same I think it would be advantageous. I was thinking of instances where the men get their pay and also get paid for the extra work they may do in the way of technical advice. That system has been found to work well.

Q. In reply to the President you seemed to doubt whether men would be willing to come to India from England on the research scholarships and fellowships?—*A.* The only difficulty that I had in mind was whether the man would be willing to cut himself off from the home University. After having come here and losing touch with the University and the professors whom he used to know it would be difficult for him to obtain any appointment at home afterwards. By the time he goes back his old professor may not be there and he will have to work for some time under the new man before he can hope to get an appointment.

Q. I am referring to men of the demonstrator and assistant lecturer class. Do you not think that men of this class would be glad to go to India for two or three years and do some work in new directions?—*A.* I misunderstood you. I thought you meant prior to their getting a junior appointment. Subsequent to their holding it I think they will be very glad to come out and do some research work in India.

Hon'ble Sir R. N. Mookerjee.—*Q.* Don't you think that the bar of the Provincial and Imperial service should be abolished? An Indian however competent he may be is appointed only to provincial service with a limited prospect. Don't you think that the men should be on the same footing?—*A.* I certainly think that a man of equal ability should get the same pay whether he is an Indian or a European.

Q. At present a man cannot rise to the Imperial service however able?—*A.* I know one case. There are many hardships of course. I quite agree with you.

Hon'ble Pandit M. M. Malaviya.—*Q.* Do you know Dr. P. C. Ray of Calcutta?—*A.* Yes.

Q. He is still in the Provincial Service. Don't you think that it is a discouragement to Indians of ability to be placed on a footing different from that of Europeans in the Indian Educational Service?—*A.* I think that given equal ability the man should have equal opportunities whether he is an Indian or a European.

Q. What University do you belong to?—*A.* Manchester.

Q. How long did you stay there after taking your degree?—*A.* Seven years.

Q. What is it that you are teaching, theoretical or applied chemistry?—*A.* Pure chemistry. The new courses have been in operation for only about four years. We have so far had only three years of Honours students. Of course the numbers are very small. There was one in the first year. He was engaged in research, and he has gone to the Coimbatore Agricultural College. From the second year one of the students is still with me doing research and the other man has gone to the Law College. Last year there were four. One of them is teaching. Another has got a studentship at Bangalore and one is at the Law College. The fourth is employed at the Sandalwood factory at Bangalore.

Q. There is no provision for teaching industrial chemistry?—*A.* No.

Q. Do you think that if there were such provision a larger number of students would be attracted to the University?—*A.* I do not think so because there are so very few openings for highly trained men on the scientific side. If a man who has got a training in pure chemistry also gets a practical training for a year or two then he would be a much better man. The opportunities are available but the students will not avail themselves.

Q. Don't you think that there is much room for a more extensive application of the knowledge of facts and processes which are known?—*A.* I consider that they can be obtained by giving the man of pure science some training in the works.

Q. Do you mean to say that to complete his education in pure science, the man must go from the college to the works to see whether he can qualify himself for an industrial career?—*A.* Yes.

Q. Don't you think that you can provide at least the preliminary training in that direction at the college?—*A*. I do not think it would be advantageous.

Q. I suppose that you are familiar with the system of instruction in chemistry that is imparted in Germany?—*A*. Yes.

Q. They provide for instruction in applied chemistry in the higher technical schools?—*A*. They do.

Q. Don't you think that a similar system could be introduced here?—*A*. Not at present. If you train half a dozen of these in chemistry you will not have the openings for them. You must have the industry first.

Q. Do you recognise the need for a large number of trained agricultural chemists in this country?—*A*. I doubt if a large number under present conditions would be useful.

Q. Do you know that agriculture is in a very backward state at present compared with what it is in Japan, America and England?—*A*. I do not know enough about the agricultural problems.

Q. The yield per acre is very much greater in those countries than it is here?—*A*. I have never studied the agricultural side.

Q. Leaving aside agriculture, do you know the progress that has been made in industrial matters in different parts of India?—*A*. I have no special knowledge.

Q. Take the manufacture of medicines. The Bengal Pharmaceutical Works are doing a great deal in that direction and there is need for a great deal more of expansion in that direction. There is especially a great demand for medicines. Don't you think that you can develop pharmaceutical works in this country?—*A*. Certainly.

Q. Take again the metal trade. You have a good deal of metal trade in this country. Don't you think you require some chemists for the metallurgical industry?—*A*. You want a certain number of chemists but not very many. In this presidency you could not employ more than one or two. It would not pay. You could hardly open a laboratory when you could not get the students.

Q. Have you any personal knowledge why they do not like to come?—*A*. I know several cases. They do not like to work the hours that are necessary. They would have to start work at 6 o'clock in the morning and work till 6 in the evening. I have known cases where posts that have been offered have been distinctly refused.

Q. You advocate the establishment of one central laboratory of a high class. Of course that is very desirable. But don't you think that in view of the vastness of the country and the great number of problems to be solved you require at least one in every province?—*A*. I do not think so. Not for purely research work.

Q. Do you know that in Germany in all the higher technical schools it is the practice to teach the application of particular sciences to particular trades?—*A*. I am only speaking of this presidency. I do not think the conditions here have developed to such an extent as to justify such a course at the present time.

Q. We had evidence from two gentlemen who gave evidence here that many of the industries were suffering for want of expert advice and assistance?—*A*. I am speaking purely from the chemistry point of view. I am not sufficiently acquainted with other subjects.

Q. You refer to a scheme which you say is very similar to one adopted in Australia. Could you tell us anything more about it?—*A*. I saw an article in "Nature" which gave an account of the proposal to found a Central Research Laboratory in Australia. I believe they have already started work but I do not know the exact state of affairs.

Q. If they have started, they have not been in existence sufficiently long?—*A*. No. It was only about last year that they started.

Q. You said in one of your answers to the President that the Chief Chemist with the Government should be brought from England for short periods. Do you think you can bring out a capable man for such a short period?

President.—*A*. What we discussed did not relate to the Chief Chemist. It was with reference to the assistant lecturer and demonstrator class.

Hon'ble Pandit M. M. Malaviya.—*Q*. Do you think that the Chief Chemist should be engaged without any reference to time. That will depend on the salary I suppose?—*A*. I think he should be a permanent officer.

Q. At present a man is brought out from England as a man of considerable ability. It is found after a time that he has disappointed those who engaged him. If he is employed for a long time it is impossible to dismiss him, but if he came out for a short term he can be sent back at the end of the period. The contract might be put an end to. Don't you think that will be a better system for the recruitment of professors?—*A*. That is the system that is adopted at present in the Educational Service. The man comes out for two years in the first instance after which he may go back or be sent back.

Q. You have suggested the formation of one central laboratory. But there are a good many problems which require to be dealt with locally. Don't you think the existence of a provincial laboratory would be useful? Take for instance the cotton industry in Bombay. Specialised problems relating to the cotton industry might be more easily dealt with in a central laboratory?—*A*. If it is a purely local problem that would have to be done on the spot. I do not see why they could not be done equally well in a central laboratory.

Q. With regard to the system of fees that you have suggested, don't you think there is a danger that the work of the professor is likely to be affected by the system?—*A*. As regards professors in colleges it is a common thing in England at any rate for the man in charge of laboratories to be allowed to do private work.

Q. Don't you think there is a danger that the work of the professor may be affected? —*A*. I know there is always a danger. But I think the advantages outweigh the disadvantages. I know there is a danger. I have said so.

ADDITIONAL WRITTEN EVIDENCE.

(Submitted after oral examination.)

I.—Note on the formation of a Chemical Department for India.

Introduction.—In considering the development of Indian industries for which the assistance of scientific investigation is essential, one cannot but be impressed by the fact that the main advances have been made in such industries as are dependent on the mineral resources of the country. Comparatively, little development has taken place up to the present, within the country, in the utilisation of the other natural resources. In seeking for an explanation of this somewhat curious state of affairs, one cannot but conclude that this is due to the fact that the organised scientific and economic researches of the Geological Survey have, for so many years, been available to the public. The more recently created Forest and Agricultural Research Departments have been at work for too short a time for their valuable investigations to be deeply impressed on the industrial development of the country and they have further suffered from the disadvantage that their work has not been sufficiently co-ordinated.

In order that full advantage may be taken of the great natural resources of India, it would appear essential that a *Chemical Department* should be formed. So far as I am aware, there is not in any country a department of the kind contemplated in this note. In England there is a National Physical Laboratory, in America the Bureau of Standards and in Australia a scheme for organised chemical research has been formulated, but unfortunately the details are not available. More recently in England an attempt to co-ordinate scientific research has been made by the appointment of an Advisory Committee of Research. The appointment of an Advisory Committee in India would be of little use in the present undeveloped state of the country.

Up to the present, the investigation of the natural resources of India has been spasmodic. There was at one time a Reporter on Economic Products whilst occasional use has also been made of the Imperial Institute in London. It cannot be said, however, the latter institute has on the whole proved to be of great assistance.

It has been generally recognised that for the industrial development of a country chemical supervision and chemical research is essential. It appears to me that such aid can best be given in India by the formation of a highly centralised department working in a Central Research Institute. It will obviously be necessary to have for certain subjects local laboratories, but these would all be conducted under the control of the Central Institute. Although at first sight the idea of a central laboratory and the centralisation of the control of chemical work in British India might appear to present objectionable features and to be likely to interfere with the originality of the individual, I do not think that such would prove to be the case, and in my opinion the advantages of such a scheme would outweigh all the more apparent disadvantages.

(1) The initial expenses and the recurring expenditure on one main research institute would be much less than for a series of small laboratories. The Central Institute could be very much more fully equipped and staffed than if several local laboratories were built.

(2) A very complete reference library could be maintained.

(3) The opportunity for discussion of problems would be of great value, a proper research atmosphere would result and this would provide an incentive to work, which is at present lacking.

(4) The work would be readily co-ordinated and all tendency to overlap would disappear.

(5) The negative results of research which are very often of equal importance to future investigators as the positive results would be on record and would prove of considerable value.

The formation of a Central Institute would in all probability be opposed on the following grounds:—

(1) That the province in which the institute was situated would tend to receive preferential treatment in the investigation of problems. This is, I consider, extremely unlikely to prove to be the case if the Director of the department regularly tours.

If the institute is properly organised and directed, the problems will be investigated in the order of their economic and scientific importance irrespective of the province which they might most benefit.

(2) It may, further, be urged that the majority of problems of economic importance can only be investigated on the spot. With this suggestion I entirely disagree except in so far as it relates to agricultural problems and even with them it is probable that much of the research could best be done in the Central Institute.

(3) It may be suggested that the subordinate staff would be mainly recruited locally, as the Indian does not, as a rule, desire to work outside his province. Full use, therefore, could not be made of the best material available. To this difficulty I can offer no solution except that I consider that with the spread of education it is likely to disappear.

It is, of course, obvious that all the chemical work in India cannot be centralised in one laboratory. Each province would continue to have its agricultural research and teaching laboratories; its toxicological and general analytical laboratories. Further there would be the chemical laboratories of the Universities and University Colleges. (See below on relationship to other departments.)

The Central Institute.—The work of the Central Institute might be, perhaps, divided into the following general heads:—

(1) Inorganic chemistry.
(2) Physical chemistry.
(3) Organic chemistry.
(4) Bio-chemistry.
(5) Analytical chemistry.
(6) Agricultural chemistry.

For consideration of laboratory accommodation and staff these heads would then be subdivided as follows:—

Main subject.	Sub-head.	Staff* D.S.	A.S.	A.
I. Inorganic chemistry—				
Superintendent .. 1.	(a) General inorganic chemistry ..	2	2	2
	(b) Metallurgy—			
	(i) Iron and steel	1	1	1
	(ii) Other metals	1	1	1
	(iii) Metallography	1	1	1
	(c) Fuel	1	1	1
	(d) Glass and ceramics	1	1	1
	(e) Building and refractory materials.	1	1	1
II. Physical chemistry—				
Superintendent .. 1.	(a) Electro chemistry	2	2	2
	(b) Testing and standardizing department	4	8	8
	(c) Physical measurements	1	1	1
III. Organic chemistry—				
Superintendent .. 1.	(a) General organic chemistry ..	2	2	2
	(b) Essential oils	1	1	1
	(c) Pharmaceutical chemistry ..	1	1	1
	(d) Oils, fats and waxes	1	1	1
	(e) Chemistry of india rubber ..	1	1	1
	(f) Mineral oils	1	1	1
	(g) Resins and gums	1	1	1
	(h) Fibres, paper-making	1	1	1
	(i) Coal tar products—			
	(i) Dyes	2	2	2
	(ii) Fine chemicals	1	1	1
	(iii) Synthetic drugs	1	1	1
IV. Bio-chemistry—				
Superintendent .. 1.	(a) Fermentation industries	2	2	2
	(b) Medical research	2	2	2
	(c) Tanning and leather	1	1	1
	(d) Foodstuffs	1	1	1
V. Analytical chemistry—				
Superintendent .. 1.	(a) Foods and drugs	1	1	1
	(b) Toxicology	1	1	1
	(c) Revenue and customs	1	2	2
	(d) Mineral analysis	1	2	2
	(e) General analysis	1	2	2
VI. Agricultural chemistry—				
Superintendent .. 1.	.. ..	2	2	2

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* For [illegible] the proposed staff for each section is shown. D.S. = Deputy Superintendent. A.S. = Assistant Superintendent. A. = Assistant. The grade of these various officers is discussed below.

It is proposed that the Central Institute should ultimately be equipped with accommodation and staff sufficient for the study of all the subjects enumerated above. In addition to the laboratories at the Central Institute, local laboratories will be necessary in each province for the following subjects:—

(1) Agricultural chemistry.
(2) Analytical chemistry.

In certain industrial areas a special testing laboratory may also be necessary (i.e., a metallurgical testing laboratory in Bengal).

It is, of course, clear that the organisation of an institute on the scale indicated above and the enlistment of the necessary staff could not be undertaken all at once. Further, it is clearly desirable that an institute of this nature should be built up gradually so that we may learn by experience the most suitable manner to organise it. It does not, however, appear to be necessary to wait for the creation of a Central Institute for the scheme to be inaugurated. There are in India a considerable number of chemists and an effort might be made at once to co-ordinate so far as possible their work and where necessary to suggest to them problems which might be usefully attacked.

NOTE.—A commencement in this direction has already been made and a number of problems are under investigation. Further an investigation of tanning materials is being made at Maihar. (This work being undertaken under the direction of the Indian Munitions Board.)

The co-ordination can probably be best done by one man and it might be desirable that once a year a conference of workers should be held to discuss the results so far obtained and to arrange the distribution of the work for the following year. (Such a conference could be held at the time of the meeting of the Indian Science Congress. This would be all the more suitable as it is suggested that the proposed Indian section of the Society of Chemical Industry should also arrange to meet at this time).

Site of the Central Institute.—Accepting the idea of a Central Institute for India, much of the success of the department would depend upon the site which is selected. The choice of the site appears to me to be dependent on the three main factors:—

(1) The utilisation of existing laboratories.
(2) Climatic conditions.
(3) Proximity to an industrial centre.

If, already existing laboratories are to be utilised as a nucleus for the department, only one laboratory can be considered, i.e., the laboratory at the Indian Institute of Science, Bangalore. The laboratories are modern, well-designed, well-equipped and provided with an adequate library. Further, they are also built to allow of ready extension.

From the point of view of climate, it is unlikely that anything more satisfactory could be found in India.

These laboratories are not the property of Government but there would probably be little difficulty in acquiring them.

We must now consider the disadvantages of selecting Bangalore as the site of the Central Institute. In the first place, the institute would be situated in a Native State although the actual site upon which the laboratories have been built was acquired by Government and is now part of British India. Secondly, the laboratory will be situated far from the industrial centres of India. Since much of the work of the laboratory will, undoubtedly, be of a technical nature this must be considered as a very serious disadvantage, since the laboratory would get considerable inspiration from the close proximity of flourishing industries. On the other hand, the comparative isolation in Bangalore would ensure that the laboratory would not be unduly influenced by local surroundings but would exhibit an equal willingness to attack the problems formulated by any part of the Indian Empire. After a careful consideration of the matter, I have come to the conclusion that Bangalore should be selected as the site of the Central Institute and if this were done, it would have the great advantage that it would be possible to commence work in the department immediately, since the laboratories and a highly trained staff are already available.

Relationship of the Department of Chemistry to other departments.—A matter of some difficulty and one which would require careful consideration is the relationship which the new department would have with other departments. It is obviously essential for the success of the scheme that all chemists in Government employ should belong to the new department. At first sight, it might appear that such centralisation would lead to difficulties. But I doubt whether such would prove to be the case and any way it offers very considerable advantages.

(1) *The Agricultural Department.*—The Agricultural Departments, in the majority of the provinces, already employ chemists and assistant chemists. I have already alluded to the necessity of providing local laboratories for agricultural research since in many cases this subject must be investigated on the spot. Further in some provinces such as, Bombay, Madras, United Provinces, etc., there are already in existence agricultural colleges. The position of officers already engaged in such work would be

unaltered except that they would become members of the new department and would be deputed by the Director to their particular posts. Whilst filling such posts they would be under the orders of the Director of Agriculture of the province; but the work which they would undertake would be decided in consultation with the Director of the Chemical Department, since he would be acquainted with the type of work for which the officer was best-suited and for special work he would depute another or an additional officer. This would ensure that the officer concerned would only undertake the work for which his tastes and experience best fitted him. It would, of course, be highly undesirable that there should be frequent changes in the departmental appointments, since in agriculture, acquaintance with local requirements and conditions is of supreme importance.

Forest Department.—The investigation of the chemistry of forest products would be one of the main features of the Central Institute and hence a special forest research laboratory, such as there is at present at Dehra Dun, would become unnecessary. The problem requiring investigation would be sent to the Central Institute and would there be allotted to the most suitable man. For teaching chemistry in the Forest Colleges, an officer would be deputed by the Director.

Geological Survey.—The Geological Survey of India has at present a small chemical laboratory for analysis and research This branch of their activities could be abolished and the work carried on at the Central Institute.

Medical Department.—The new department would overlap with the activities of the Medical Department in three branches—(1) analytical (2) teaching and research in medical colleges and schools of tropical medicine; and (3) medical stores.

It has already been mentioned (see above), that local laboratories for analytical purposes would be necessary. In these the toxicological and other analysis at present carried out by Chemical Examiners would be made. Such laboratories would be under the control of the Director of the department and it will not be necessary for the posts to be filled by officers of the Indian Medical Service. The same applies to the officers engaged in teaching chemistry and conducting bio-chemical research in medical colleges. The Director would depute officers to these posts who would then be placed under the orders of the Principal of the college. It has already been suggested that the new central laboratory should have bio-chemical and pharmaceutical research departments. The new department would, of course, co-operate with the Medical Research Committee and investigate such problems as they might suggest.

The Medical Stores afford a somewhat different problem and it might prove desirable that they should be left unaltered, the Central Institute undertaking any research that they may desire.

Ordnance Department.—The Ordnance Department, at present, employs chemists in the Cordite Factory and for other purposes. I am not in a position to judge as to whether it would prove desirable that such officers should be included in the department.*

Special scientific officers.—Local Governments employ occasionally special scientific officers. The need for them would cease, since officers for any special investigation would be deputed from the Central Institute.

Revenue Department and Customs.—The necessary analysis for Revenue and Customs purposes would be made in the local analytical laboratories alluded to above. This would introduce in certain cases a considerable saving in laboratory expenses. All research work for these departments would be undertaken at the Central Institute.

Education Department.—The relationship of the new department to that of education would be of special importance, since universities and colleges would be the training ground for the future officers of the department. A considerable number of chemists are employed in the Educational Department, and are in many cases teaching and conducting research in well-equipped laboratories. It must, however, be admitted that neither the teaching nor the quantity or quality of the research attains as a rule, a high standard. This is not the place to discuss the reasons for this. The officers teaching chemistry in the Government Colleges would be appointed by the Director of the Department of Chemistry and deputed by him to a particular post, whilst filling that post, they would be under the orders of the Director of Public Instruction. A scheme on these lines has already been worked to a limited extent in the deputation of officers of the Geological Survey to be professors in colleges, in Poona, Madras, and Calcutta. The new scheme will have the great advantage from the educational [illegible] of view that officers could not be transferred from teaching posts to the inspecto[illegible] and further, in that it would be possible to maintain a "leave reserve" so that when an officer proceeds on leave his post could be filled efficiently which cannot at present be said to be the case.

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* Note.—The same consideration applies to officers employed in the Mints.

Organisation and pay.—In order that the Department of Chemistry may be staffed in the best manner possible and further that officers once appointed to the department may not be tempted to resign, it is essential that the pay should be adequate and the conditions of service satisfactory. I should recommend the following organisation and pay:—

	Pay. RS.
Director	3,000
* Superintendents selected from class (1) below	2,000

(1) *Deputy Superintendents.*—The officers recruited to this class should be graduates in honours of European or Indian Universities with some years' experience in research and who have shown themselves to be possessed of ability for original research. In addition a certain number of officers recruited to this class should have had technical experience. Pay Rs. 500-50-1,500.

(2) *Assistant Superintendents.*—Officers of this class would be recruited from University graduates of ordinary ability. They would be utilised for carrying out the routine work of the laboratory. In exceptional cases they might be promoted to class (1). Pay Rs. 150-20-300.

(3) *Assistants.*—Officers of this class would not necessarily be graduates. They would be required for assistance in routine work especially in routine analytical work. In exceptional cases they might be appointed to class (2). Pay Rs. 50-10-150.

A Special Officer—an Engineer. Pay Rs. 500—50—1,500.

Estimate of the cost of the Department of Chemistry—Staff at the Central Institute.

	RS.
One Director at Rs. 3,000	36,000
Six Superintendents at Rs. 2,000	1,44,000
Forty-one Deputy Superintendents at Rs. 500—1,500	4,92,000
Forty-three Assistant Superintendents at Rs. 150—300	1,08,200
Forty-three Assistants at Rs. 50—150	51,600
One Engineer at Rs. 500—1,500	12,000
Total	8,88,800

No attempt can be made to estimate the cost of the menial staff without a detailed plan of the institute.

Staff in local laboratories and educational institutions.—The cost of the staff in local laboratories and educational institutions would not be a new charge and need not, therefore, be considered in this estimate.

Cost of the Central Institute.—If the Indian Institute of Science, Bangalore, is selected as the site of the new institute, this institution would have to be purchased. I am aware that the cost of this institution has been extremely and unnecessarily high but as part of the cost has been met by grants from the Government of India, these grants could be set off against the amount to be paid. I am unable to make any estimate of the cost of acquiring the institute.

Estimated cost of extending the present buildings.

	RS.
Cost of buildings	10,00,000
Cost of fittings	5,00,000
Total	15,00,000
Annual grant for stores, etc.	50,000

Summary of expenditure.

Non-recurring.

	RS.
Cost of the Indian Institute of Science	?
Cost of extensions	15,00,000

New recurring expenditure.

Salaries, approximately	9,00,000
Laboratory expenses, approximately	50,000

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* Note.—The pay of Superintendents would perhaps be put more suitably in the following manner:—Grade pay plus personal allowance of Rs. 500.

The work of the department.—As has already been stated, it is proposed to concentrate in a Central Institute the bulk of the chemical research work in India. The wide scope of the work which it is proposed to undertake is clearly indicated by the suggested departments and staff. It is not intended that the work done in the department should only be of economic importance, since it is recognised that what is generally called applied chemistry is only a branch of pure chemistry and that the development of the one is bound to go hand-in-hand with the other. It will be the aim of the institute to investigate the uses to which the various natural products, inorganic and organic, of the Indian Empire can be placed; to improve the quality of the articles already produced from these products; to assist in the establishment of new industries; to assist commercial firms in the solution of problems that they may encounter; to test and standardise instruments and to perform in general the work of the National Physical Laboratory in London; to assist in scientific education by supplying the Chemistry staffs of Government colleges; to train research students; to assist the Medical Department by the investigation of bio-chemical problems; to investigate the problems of Indian agriculture.

There remain for consideration three other points:—

(1) Under what conditions will the commercial development of the researches carried out by the department be undertaken?

(2) Under what conditions will private firms or individuals be allowed to utilise the services of the department?

(3) In what form will the work of the department be published?

With regard to (1) the results of experiments would, as a general rule, be available to the public. In special circumstances, Government might patent a process, the patent rights would not be worked by Government but would be sold to some firm or individual.

With reference to (2) the services of the staff of the institute would be at the disposal of any firm or individual. They would be required to pay for the work done, the results obtained being confidential and the property of the firm or individual.

With regard to the question of publication of the results of the work of the department this would take place either in a departmental journal or through the ordinary scientific channels.

Summary.

(1) It is suggested that the establishment of a Chemical Department for India is highly desirable.

(2) The necessary departments and staff of such a body are enumerated together with an approximate estimate of the cost.

(3) The site for a Central Institute is discussed.

(4) The relationship between the new department and the present departments of Government is outlined.

(5) The work to be undertaken by the new department is summarised.

ADDITIONAL WRITTEN EVIDENCE.

(Submitted after oral examination).

II.—*Education and the Development of Chemical Industries.*

The development of chemical industries in India will create a demand for highl trained chemists. It appears, therefore, desirable to consider what facilities are a present available for the training of the requisite staff and further what extension are likely to prove necessary.

In so doing it is highly desirable that we should attempt to profit by the experienc gained elsewhere. It is of course obvious that the chemists will in the first place have t be largely recruited in Great Britain but in the future this should not prove to b necessary if adequate opportunity for training is afforded in India. The scheme whic I advocate in this note should be inaugurated subsequent to the introduction of th various industries, since it is futile to create a supply before there is a demand.

It is extremely difficult to suggest the most satisfactory training for a chemist wh proposes to enter a chemical works and so far as I am aware no course meeting wit unanimous approval has as yet been devised.

In my opinion the chemists employed in works can be divided into three mai classes—(1) the research chemist, (2) the chemical engineer, (3) the routine analyst.

The education of the type of chemist required for class (3) offers little difficulty an probably any university pass student in chemistry of average ability can be traine in the works itself to carry out the requisite work.

This note is mainly concerned with the extremely difficult problem of trainin chemists belonging to classes (1) and (2).

It must be admitted that it is impossible to draw any hard-and-fast line of distinction between these two classes, in actual works practice they gradually merge into one another, but from the point of view of training it is, I consider, possible to separate them.

The duties of the research chemist in a works will, in general, be, to improve the processes in use and to devise new processes. He will investigate the latter in the laboratory, in a small experimental plant and finally in conjunction with the chemical engineer he will introduce the process into the works. It is clear, therefore, that he is employed mainly for his ability as an investigator, the actual details of the operation on a large scale being entrusted to the chemical engineer.

The requisite training for this type of chemist is, in my opinion, already available in India. He should be a university graduate with an honours degree in chemistry who has done at least two years' research work. I admit that such a chemist when he enters the works will be of little value to his employer and this fact should be fully recognised. He should, therefore, for his first year be mainly employed in getting a thorough grasp of the details of the various processes in use, working through each process himself. When he has done this his services should be transferred to the laboratory and utilised in the scientific investigation of the works problems. It is obviously impossible to forecast the success or failure of the chemist which will depend solely on his ability. I do not consider that the chemist required for this type of work would benefit by going through the training afforded by an ordinary technical school.

The problem of training the chemical engineer is one of much greater difficulty and the only satisfactory solution of this problem which I have seen is the one suggested by Mr. F. H. Carr of Nottingham. It is, I think, generally agreed that the chemical engineer should receive the ordinary training in chemistry, physics and mathematics, such as the honours chemistry graduate receives. The real question at issue is, how he may also obtain an adequate knowledge of engineering. The special training in the technical schools has not on the whole proved successful and in place of this the scheme suggested by Mr. Carr would appear to be worthy of very careful consideration.

As is well known there is a considerable demand for small quantities of fine chemicals and pharmaceutical products and in view of their variety, it is not as a rule remunerative for ordinary works to undertake their manufacture. Mr. Carr suggests that the chemical manufacturers should combine to start an institution in which these products should be manufactured and sold. This institution would be utilised for the training of chemical engineers who would prepare the various products on a commercial scale. They would in this way become acquainted with the various processes used in works. They would at the same time receive instruction in the general principles of engineering practice, strength of materials, machine drawing, etc. The course would extend over three years and since the institution would be in a measure self-supporting owing to the sale of its products, it is proposed that during the second and third years the students should receive a small salary provided that their work was satisfactory.

It is clear that in India such an institution would have to be maintained by Government. Its growth would be gradual, *pari passu* with the development of chemical industries. It would be most advantageously located near the Central Chemical Laboratory of the Department of Chemistry, the formation of which has been advocated in the previous note. This would possess the advantage that the large scale apparatus would be available to the research department, whilst the students undergoing training would greatly benefit by living in an atmosphere of chemical research.

The new institution should be under the control of the Director of the Department of Chemistry and not under the Education Department.

Summary.

1. The question of the training of chemists who will be required for the new chemical industries is discussed.
2. It is suggested that the works chemist can be divided into three classes.
3. A suitable method of training for these three classes is outlined.

Witness No. 210.

Mr. N. Haussmann, *Manager Aska Sugar Works and Distillery, Aska, Ganjām district.*

Written Evidence.

While feeling highly complimented for my nomination by the Government of Madras, to whom I hasten to tender my most sincere thanks, it is not without considerable diffidence that I presume to give expression to my views on such of the subjects as my limited experience of about twelve years has enabled me to acquire regarding the people and places of the northernmost corner of the Madras Presidency.

Of course, I do not pretend to grapple with all the questions nor is it expected of me, but even the few that I propose to deal with, can at the most be done only superficially and the views on the subjects are far from being exhaustive or authoritative. I will simply give my observations which my acquaintance with these parts has afforded me, for what they are worth, meanwhile realising how very far-reaching and eminently important the various issues involved in them are. There can be nothing new or revolutionising in these suggestions I make but proceeding, as they are, from a foreigner, Swiss as I am, they may claim the merit of being impartial which it is my best effort to be.

It serves no purposes to indulge in discussing whether India is growing richer or poorer or trying to apply any tests by way of examples from other countries and instituting any comparisons, for India is a country of a unique character, full of paradoxes and puzzles, so much so, that the labours of any one trying to introduce anything like reform on a uniform basis, are foredoomed to failure, however, assiduous and sincere they may be. Conditions in India are substantially different from those prevailing in any other country in the world and in India itself one faces features in one part which are so totally different from those of another, however adjacent it may be, that one who forgets that he is dealing with India and Indians is sure to make a mistake. To be more explicit, what holds good in Bombay with the highly enterprising Parsee hardly applies to Madras in spite of the wealthy Chetti. Unless one dives deep and studies the habits of the people, their long-standing customs, traditions, prejudices and principles of living, he cannot succeed in formulating any opinion. Coming more directly to the province I have to take into account, it is well known that the Ganjam district is the most backward of the Madras Presidency and I will not be very much mistaken if I call it one of the poorest. This province is peopled by Indians of whom the Uriyas, notorious for all that makes for the absence of anything like enterprise, form the majority with hardly any of the more advanced races of India to set an example or create a sense of enterprise or develop the instinct for business. Hitherto it had been able to attract the notice of a few enterprising Europeans among whom I must mention with great respect, the name of the late F. J. V. Minchin, Esq., my quondam Principal, who made the Aska Sugar Works and Distillery what it is. Even his life-long labours in these parts only succeeded partially, for the ryots who grow sugarcane today are not more enlightened and more pushful than their forebears half a century ago.

A few other industries could have also been brought into being, though on a modest scale, if there was sufficient initiative and financial support. So long as the people entertain the time-honoured ways of receiving any new enterprise with perfect indifference and scanty response, matters cannot of course improve. My own experience convinces me that any new scheme with nothing but the hopes of raising the necessary capital in the district itself for its floating is doomed to failure. The people are not at all trained to trust themselves much less others and until the spirit of greater confidence and co-operation is generated the State has to undertake the initiative directly or indirectly even in the matter of small industries. As matters stand, such of the minor industries in the district are mainly worked with borrowed capital, in most cases at very high rates of interest, which spells, sooner or later, certain ruin to the enterprise, spreading discouragement like wildfire through the people. The importance of immediate legislation by the Government against the poor labourer falling a prey to the avarice of the greedy moneylender cannot be overrated, and to save the situation of the poor workman it is not too late in the day for the Government to take the question in hand and enact a law of usury penalising the charging of interest at more than, say 12 per cent per annum.

The State ought, in the first place to do all that lies in its power to free the miserable workman from the grip of the sowcar before it can expect to revive industries which have become defunct for want of financial support or foster new industries with the necessary capital. This could be done only by stimulating banking facilities and in this connection the activity of the Government in encouraging co-operative societies might prove beneficial.

Considerable impetus could also be given to new and existing industries in this district by a branch of a bank being opened at Berhampur with the object of giving financial aid to enterprise on the security of landed properties, plant, forest and agricultural produce, etc. I understand that the Bank of Madras has unfortunately discontinued lately granting loans in these parts on the security of tangible agricultural produce and this has greatly embarrassed the local trade.

The aid of Government by supplying the necessary machinery and plant on the hire purchase system and sometimes with part of the share capital to enable the concerns to work will be of great advantage. As regards the nature of supervision for the period during which direct assistance lasts, it will be best if it is placed in the hands of Directors of Industries for each Province with their Advisory Boards who shall exercise direct control over the management of industries so concerned within their respective areas.

Pioneer

Until the people are educated to a greater sense of mutual trust and the spirit of enterprise is at least partially developed, the Government should take the lead in everything to make the people interest themselves in the industries that can successfully be raised in this district by the opening up of pioneer factories. The Government should of course exercise great caution before opening any pioneer factory. It should have the best expert advice based upon thorough enquiry into all the local conditions and, in my opinion, the management of any pioneer factory should be in the hands of a really competent businessman who has in the first place the full success of the concern at heart.

I consider it desirable that as soon as a pioneer factory has proved to be worked profitably, it should be handed over to private enterprise.

Sales a

With regard to sales agencies or commercial emporia for the sale as well as the display of products of minor and unorganised cottage industries I would suggest that special stalls should be established under Government supervision in the markets of big towns, such as the New Market in Calcutta where the articles would be exhibited and offered for sale both wholesale or retail, and thus find buyers.

Exhibi

From the experience I have had by visiting a great number of exhibitions, big and small, in London and elsewhere in Europe I am not in favour of grand, elaborate exhibitions for India but I am inclined to think that for the benefit of the industries the Government should encourage the holding of exhibitions of moderate scale and popular in character, say one industrial exhibition every alternate year in one of the Presidency towns, would be sufficient, and in order to attract the greatest number of visitors from all parts of India, the Government should induce railway companies to grant concession rates as low as possible.

Indust schools

I regret to say that nothing has been done in this district to improve the labourers' efficiency and skill. I consider the best way for improvement in this direction would be to have the youths from the labouring classes gradually trained by establishing model workshops in different centres of this district. These might be under the supervision of the municipalities or unions as the case may be and placed under the control of the Director of Industries with his Advisory Board. Boys who are desirous of higher training and who prove themselves to be competent should be sent at Government expense to the industrial school which should be established in one of the centres of our province and controlled by a Department of Industries.

Officia

For the future development of industries in this Province I am of opinion that there should be an Advisory Board presided over by the Director of Industries. The Advisory Board should consist of a number of business people such as mill proprietors, managers and engineers carefully selected from the different parts of the province. I think the Director of Industries should be a member of the Indian Civil Service; preference should be given to one with good commercial and industrial knowledge. To form an Imperial Department under a single head having under him a Director of Industries in each province would be a step in the right direction.

Indust journa

Under the present educational conditions of the country the medium of industrial and commercial intelligence to be effective must be the vernacular of the people. In the district of Ganjām, there is a successful vernacular weekly, the "Asha", published at Berhampur. This being the only paper in the district, it would be advantageous to substantially help the paper, also supplying such information as the Government may deem fit through its Department of Industries.

Railw

Apart from the main line running from Calcutta to Madras and the small 25 miles feeder line from Naupada to Parlakimedi there are unfortunately, no other railway facilities in the district and I hold the view that the lack of light railways immensely hampers the development of local industries. I would strongly urge that the construction of the light railway from Gopalpur to Russellkonda via Aska and Surada which has been surveyed about two years ago should be taken on hand without any delay as this line would greatly facilitate the speedy and regular transport of industrial and agricultural produce from the interior to the main line and the chief sea port of this district. Besides the proposed railway line would have a beneficial effect on the Aska sugar industry, as the output of sugar would be greatly increased if cane could be brought in from more distant parts. The working power of the Aska Sugar Works is greatly hampered for want of quick locomotion. It is also very desirable that the building of the bridge over the Mahanadi at Aska should be taken in hand as early as possible to improve the traffic from Bellugunta to Aska.

Shipp

The shipping of produce from Gopalpur to Indian and foreign ports is almost at a standstill owing to the scarcity of tonnage and the prohibitive rates of freight now ruling. I am unable to suggest any remedies but give the above as a matter of information.

Fores

In the interests of industrial development in the district, I am of opinion that in order to obtain a greater quantity of raw products such as sugarcane, hemp, oil-seeds, etc., it is of the utmost importance that any waste land in the Goomsur division available for cultivation should be made use of, but I understand that the present forest rules

Thousands of acres of such land remain at present uncultivated for the simple reason that when the poor ryot is applying for such land he is not able to pay the value of the forest growth standing on the land, as fixed by the Forest Department.

I would strongly suggest that the restrictions imposed by the Forest Department on the acquisition of waste lands be removed altogether and the land given to the intending cultivators free from all liabilities, except the Government assessment of land revenue. Regarding the forest growth found in the lands proposed to be given to the new ryots, the Forest Department may be advised to arrange at their own cost the removal of the supergrowth to the nearest market for disposal.

The suggestion herein made is calculated to lead to a striking development in the industrial and economical condition of the otherwise backward people, who might find their livelihood in the indigenous agriculture and thus be spared from the miseries of emigration.

Jail Competition.

I have no complaint to make regarding competition by jail industries.

General.

Development of the local sugar industry.

As Manager of the Aska Sugar Works and Distillery, I am actively concerned in the sugar industry which, thanks to the timely help rendered by the Government, in imposing countervailing duties on foreign sugars, has been saved from ruin and it is most desirable that more stringent measures should be imposed after the termination of the war on the import of foreign sugars to protect the indigenous sugar industry.

With regard to the quality of the sugarcane cultivated in these parts, I have indeed felt the need of improved cultivation. The opening of an experimental farm seems to me to be a necessity of the first order. I would therefore, suggest that a small model farm for the exhibition of sugarcane cultivation on an improved basis may be established somewhere near Aska.

Should this suggestion be given effect to, as a corollary to it, I would next suggest that sugarcane seedlings of an improved variety may be supplied to the ryots free of cost on a limited scale for sometime till the new inspiration gains ground.

New industry.

The present war has told us the lesson that India has been depending too much on the Continent of Europe for the importation of paper of cheap qualities and I am of opinion that there are great possibilities of increasing the output of such papers in this country.

As far as my knowledge goes there is no suitable wood to be got from the jungles of these parts which could possibly be turned into wood pulp for the manufacture of paper, but there are other raw materials which, I think, could be made use of as a workable substitute, such as the waste product of the sugarcane, known as Megasse, which with an admixture of bamboo, I understand, could be converted into pulp suitable for the production of packing and ordinary writing paper for which there is always a ready market.

Of course the quantity of bamboo obtainable at present is limited and a start could only be made with a pulp factory of a moderate scale, but, if the Government were pleased to take the necessary steps by advising the Forest Department to start at once extending their bamboo plantations, I feel almost convinced that within a period of five years this suggested new industry could be considerably extended and a suitable paper mil added to it as a profitable concern.

ORAL EVIDENCE, 24TH JANUARY 1917.

Sir F. H. Stewart.—*Q.* You say you have been about twelve years in the Madra Presidency?—*A.* Yes, only in Ganjām.

Q. All the time at Aska?—*A.* Aska and Gopalpore.

Q. Have you been longer than that in India?—*A.* I have been in India altogethe 15 years.

Q. You say, "I understand that the Bank of Madras has unfortunately discontinued lately granting loans in these parts, on the security of tangible agricultur produce, and this has greatly embarrassed the local trade." Is that correct?—*A.* Ye that is true. I have information direct from Gopalpore. It concerns mostly th hemp business.

Q. You don't know it from your personal knowledge?—*A.* I have a certain amoun of experience of the hemp business for two years.

Q. Have you asked for assistance from the bank and been refused?—*A.* N personally, but I know certain people who have tried to get advances and have be refused.

President.—*Q.* Do you know whether the bank may not have had other go reasons?—*A.* I don't see why; it was done formerly; only since last year it w refused. I don't see any reason why. Hemp has a value; there is no [illegible]

Q. There has been recently a sudden and violent change in the value of local products of that kind. Do you think the bank had other personal and specific reasons?—*A.* The value of hemp is Rs. 60 a candy. If they gave 50 per cent it would be something.

Sir F. H. Stewart.—*Q.* Is there a branch of the Bank of Madras there?—*A.* In the olden times, there was a branch in Berhampur; it was stopped.

Q. There are no banking facilities at all? Are there no banks?—*A.* No banks absolutely in our district.

Q. You make a suggestion with reference to the publication of a commercial and industrial information in a local vernacular paper; has that paper got a large circulation do many people read it?—*A.* Among the Uriya population it is the only paper they have. It has a circulation of perhaps 2,000 copies; I am not positive on the point It is the only paper we have; the only one that is read among the Uriyas.

Q. Then you refer to the restrictions imposed by the Forest Department in regard to the acquisition of waste land. Is there much of that land in your district?—*A.* I would say no less than ten thousand acres.

Q. And you think that the Forest Department should remove the super-growth themselves?—*A.* Quite so. Take the case of Russellkonda, the waste land there might be 30 or 40 miles from Russellkonda. The value of the scrub is the same as at Russellkonda. It is no use to the man who wants to buy it, as the bandy hire would be so high that it would not be of any use. It would be too high to buy unless he went into the hands of the money-lender.

Q. You mean the cultivator cannot afford to pay for the land with this super-growth on it?—*A.* I am convinced he cannot, because it is mostly land cultivated by the poorer classes.

Q. Is there much emigration from your district?—*A.* Yes, we have between fifteen to twenty thousand coolies who go to Rangoon every year.

Hon'ble Pandit M. M. Malaviya.—*Q.* You say that the "ryots who grow sugar-cane today are not more enlightened and more pushful than their forebears half a century ago." Has there been any spread of education among them?—*A.* Absolutely none.

Q. They have not been touched by it?—*A.* Not at all.

Q. Do you ascribe their backward condition to the want of education?—*A.* Yes, to a certain extent. Education would be beneficial to the ryot, because he would have more confidence. Now when we advise him, he won't believe us, as he distrusts us.

Q. You say, "The people are not at all trained to trust themselves, much less others, and until the spirit of greater confidence and co-operation is generated the State has to undertake the initiative directly or indirectly, even in the matter of small industries." What means do you think will be most efficient; do you think the State should encourage industries by supplying machinery on the hire-purchase system?—*A.* I am inclined to think that by helping the smaller industries by supplying machinery.

Q. And you suggest that banking facilities should be increased by co-operative societies being extended?—*A.* Certainly, yes.

Q. Are there no co-operative societies in your district?—*A.* They have started recently, but among the Uriya classes it will take time.

Q. Do these co-operative societies help agriculturists only or industrialists also?—*A.* I think it is more agriculturists.

Q. And you want similar facilities extended to the men engaged in industries?—*A.* Yes, the small industries.

Q. Is there any arrangement for supplying yarn or raw material to these small industrialists?—*A.* The greater part is going to the man who supplies the money, the sowcar.

Q. Is it the sowcar who performs that function at present?—*A.* Yes, he is the medium.

Q. You think that if there were co-operative societies who took up that function, they would supply material cheap to the manufacturer, and so help them better?—*A.* If this could be done it would be a great advantage to the small industrialist.

Q. You have suggested a branch of the bank at Berhampur; do you want a branch of the Bank of Madras, as it exists, or do you want a branch that will advance loans to industries on the security of their buildings, machinery and stocks?—*A.* I am not particular that it must be the Bank of Madras, unless the Bank of Madras would agree to certain terms that they would give loans on landed property. Formerly they gave only on agricultural produce, but it would be much better if the bank could be induced to help industrialists by giving loans on landed property and plant.

Q. You think there is more room for industrial development in your district if banking facilities were increased?—*A.* It would help to a certain extent.

Q. You recommend the establishment of an industrial school in one of the centres of your province. Don't you think your district is large enough to have one industrial school for itself?—*A.* I am more in favour of a central school on a large scale. If you have a school on a moderate scale, there will be difficulty in getting first-class teachers, whereas if you had an industrial school in a central place, you could get superior teachers.

Q. In addition to that, as a feeder to that well-equipped central school, would you also recommend the establishment of an industrial school of a more elementary type in this district?—*A.* I would prefer to see one at Aska, a small workshop where they could start carpentry and mechanics, and if there are pupils among them you could judge if they were capable, and help them to be admitted in a big industrial school.

Q. Do these works take in these boys as apprentices?—*A.* We take of course, but now it is very difficult to get apprentices, because there is very little industries at all.

Q. You don't get educated boys?—*A.* No, it is difficult to get them. Is not the knowledge of English widely prevalent in your district?—*A.* Almost none. Among our working classes there are none speaking English, all speak Uriya.

Q. Among the Indian trading community?—*A.* Mostly the Telugus.

Q. Those who do, do not possess a sufficiently high degree of knowledge to benefit by lectures in English?—*A.* I don't think they would.

Q. You speak of the difficulty which the depressed classes feel in acquiring waste lands; are these waste lands allowed to remain fallow, and not given to those who apply to lease them?—*A.* Certainly they are given, but afterwards the man has to pay the Forest Department for the super-growth on the land, and the poorer classes cannot afford to do it. Sometimes it comes to Rs. 150 and 300, which he cannot pay.

Q. You want these lands to be given on better terms?—*A.* Yes, mostly to the poorer classes.

Q. You think if such leases were given, emigration would be somewhat diminished?—*A.* Yes, I am convinced, because many people among the cooly classes don't want to go, but are forced to go, because they cannot find employment at home.

Q. You apprehend that after the war, the import of foreign sugar will create a difficulty for indigenous sugar?—*A.* I am afraid yes.

Q. Apart from the suggestion that some protection should be given to indigenous sugar, have you any other suggestion to make to ward off the evil?—*A.* I think the import duty should be maintained and also increased. We cannot compete with foreign sugar.

Q. You also suggest that sugarcane seedlings of improved variety should be supplied free of cost to ryots; do you think they will cheerfully receive these seedlings and use them?—*A.* Not at the beginning, because he is so accustomed to his old style that it will only be gradually possible to induce him to take it.

Q. Do you think popular lectures would be of any benefit?—*A.* I am more in favour of an experimental farm to show the people how to improve sugarcane cultivation. For instance, if the present type of cane is kept for 12 to 15 hours, it starts to ferment. In Mauritius canes last two or three days and don't get spoilt at all.

Mr. C. E. Low.—*Q.* Do you grow very much cane yourself?—*A.* We don't cultivate any cane; we buy the cane from the cultivators and advance them money at the beginning of the planting season. We help them as much as we can. We give them advances and charge them only 6 per cent interests. We fix the rate, and if the man does not wish to give the cane, he is free to use it for jaggery. We pay such rates that the cultivators come to us quite readily.

Q. What rates do you pay for the cane?—*A.* The present rate is Rs. 6-13-6 per thousand pounds.

Q. How much is the local yield per acre?—*A.* I could not say exactly.

Q. How many tons a day is your factory designed to crush?—*A.* We can work daily about 120 tons in 24 hours.

Q. Are you a limited company?—*A.* No, a private concern.

Q. What mill have you got; how many rollers?—*A.* We have no mill; we have the diffusion system; the German and Austrian system.

Q. What extraction de you get?—*A.* Do you mean the percentage?—*A.* By boiling it out, no sugar remains in the cane there might be a small percentage. When the cane is boiled out there is nothing left.

Q. Is your local cane high quality cane or a thin cane?—*A.* Thin cane.

Q. Do they manure?—*A.* Not sufficiently. That is why it would be better to have a model farm to show them what manure to use and how much.

Q. What is the manure they use?—*A.* All oil cake.

Hon'ble Sir R. N. Mookerjee.—*Q.* You said the Government should have direct control; what sort of direct control do you mean?—*A.* For instance, if an industrial concern has taken machinery or plant on the hire-purchase system, as long as the machinery is not paid for, the Director of Industries should have a certain control over the concern, to see that the plant is properly kept, and not destroyed in any way, and that everything is in working order.

Q. Not interfering with the business part of it?—*A*. Not the business part, only to see that everything is properly managed.

Q. With reference to your complaint about the Forest Department, have you ever referred the matter to the Agricultural Department?—*A*. Not up to now.

Q. Nor to the Forest Department?—*A*. No.

Q. Nor to any local officer?—*A*. Not to my knowledge ; I don't think so.

Q. *Hon'ble Sir Fazulbhoy Currimbhoy*.—Do you think that if model farms are established by Government, the cultivators will be able to take up all these things and plant just like the model farm?—*A*. It will take some time at the beginning. I don't think the cultivators will adopt the system at first ; it will take some years. We would induce some of the leading ryots who are a little more educated to explain matters to the others and show them.

Q. Don't you think it will take a very, very long time?—*A*. I think it would be a matter of a few years' time.

Q. Don't you think that the chief difficulty with regard to the sugar industry ; is that because the land is so much divided up, there is no direct control on a big piece of land. Do you think if these lands were brought under direct control and they grew the cane according to a scientific process, and got for the factories the quantities they needed, that they would then be able to compete with foreign sugar?—*A*. I don't think it is possible, not in our district.

Q. Supposing it is possible, and Government get the land?—*A*. That would be a great advantage.

Q. Don't you think that would be the only way of successfully competing with Java sugar? As you know the local produce in India has only been from 10 to 15 tons, while that of Java sugar was 40 to 60 tons, so it is possible to compete with them if the sugar was of the best quality and it could only be grown if there was a big plantation?—*A*. I agree with you, but I am afraid we cannot compete with Java sugar. I am inclined to believe that Java is more favourable for cultivation. The cane grows better there. I don't think you could ever get a big area together for cane cultivation.

Q. Supposing Government, under legislation, took the land, say 5 or 10 thousand acres, don't you think that would be the best way, if we want to stop foreign sugar ; or do you think there is no possibility?—*A*. Of course the more cane that could be cultivated in India the better it would be.

Q. Then you say about your sugar, " I understand that the Bank of Madras has unfortunately discontinued lately granting loans in these parts, on the security of tangible agricultural produce." Can you give us an instance of this ; why have they stopped this ; have they suffered any loss?—*A*. I think it is mostly owing to the war. I don't think they have lost anything.

Q. I suppose it is only a temporary measure?—*A*. I think they might give it again. I am positive that the Bank of Madras never had any loss in our district.

Q. You say you charge only 6 per cent interest on the money you advance ; how do you fix the prices?—*A*. At the time when we are starting sugar we call all the ryots together and have two or three meetings, and we make them offers. They make us counter-offers ; we discuss matters until we come to terms.

Q. You fix their prices before cultivation is done, or when the cane is ready?—*A*. When the cane is ready.

Q. Are there any instances in which they were sold to outsiders?—*A*. No, the ryot has option to give the cane to us or mill it himself and turn it into jaggery.

Q. Do you think that by the co-operative system you will be able to do better?—*A*. I think it would be beneficial to the ryots.

President.—*Q*. Have you any difficulty in recovering your money?—*A*. We very often have difficulty, but we are very lenient to them. We don't press at all for our money and avoid Court cases and give them time, and help them another year. We help as much as we possibly can.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. You think that the Director of Industries should be a member of the Civil Service ; don't you think he should have two or three years experience before he becomes Director of Industries?—*A*. I think an Indian Civil Service man, who has experience in Customs, should be able to take up the work. He would be preferable, and very soon he could pick up the work.

Q. Don't you think that even an Indian Civil Service man should have two or three years' experience?—*A*. It is not absolutely essential.

Q. You say there is a paper, the "Asha", that should be assisted by Government. By whom is this paper conducted; is it a commercial paper?—*A.* No, it is a general paper; it contains any little article which interests the Uriya population. The people are very backward. If they got news about industrial business, it would help them a little.

Q. Is your sugar sold in this part of the country only, or in other parts of India as well?—*A.* Only in our districts; we sell some to high-class Hindus in Bombay. Our sugar is absolutely pure; we don't use any refining drugs.

Q. Do you think before the war it was a paying concern?—*A.* No, it was not.

Q After the war will it be a paying concern?—*A* Provided the import duty is maintained If this is abolished we will be losers.

Q. Do you think this small duty will protect you. when large quantities can be shipped easily and freights go down?—*A.* My opinion is that the duty should be raised.

Q. Suppose the present duty is kept as it is, and at the same time suppose freights go down after the war, and there is ease in getting ships, to bring Java sugar here, do you think you will be able to maintain, with this duty, the fight against foreign sugar, with profit?—*A* We will be able to have moderate profits.

WITNESS No. 211.

MR. MOTHEY GANGARAJU, *Secretary and Treasurer, the Krishna Jute and Cotton Mills Company (Limited), Ellore.*

WRITTEN EVIDENCE.

Q. 1, 2 *and* 5.—Labour and capital are the two difficult items that always stand in the path of industrial enterprises in India. It was found very difficult to raise the capital for starting our jute mill industry on the joint stock system, and only a small sum was subscribed for after a deal of toil and trouble. The major portion was subscribed by myself and my family, and it may not be presumptuous if I state that the jute mill owes its existence to my brains and it is the pioneer industry on the joint stock system in these parts. To encourage such industrial enterprises, Government must reserve some funds in the industrial commercial or agricultural banks to facilitate the organisers and promoters of such industries in taking loans, when required, free of interest or on some nominal interest, to be repaid on some specific dates. It is for want of such financial aid from Government that important industries miserably failed after they have come half way, perhaps sometimes at the stage of inception itself. Till the industry stands firm on its own ground, Government should supply raw products of jute purchased under its agency, and under the direct supervision of the Director.

Q. 8.—Pioneer industries go a long way to encourage the capitalist to invest his dead stock on some great enterprise to the mutual advantage of the capitalist and the labourer alike. Such industries will serve as famine-relief works also. After the Government have received back the money so financed on any industry, when the industry is absolutely free from all liabilities and encumbrances, any capitalist wil come forward to take it. I know many experimental paddy and indigo farms having failed for want of financial aid from private or Government agencies, which would have otherwise flourished even had a co-operative society propped them up with funds in season.

Q. 22.—Research is urgently required in the direction of dye-stuffs, and it i advantageous to have provision for research for such special subjects in the Unit Kingdom at the expense of the State, in view of the prohibitive price of dye-stuffs now ruling the Indian market owing to war.

Q. 25.—*Agricultural and forest survey* is necessary to ascertain what agricultura products are necessary for the development of industries; whether jute can be exten sively grown in the soils of the Kistna and Gōdāvari districts, whether the soils ar congenial to the growth of jute crop;—seeds and expenses for cultivation and jut cutting experiments being supplied by Government.

For jute factories, bobbins will be largely required for which there is speci wood. At present, bobbins are made in Japan, and imported to Calcutta. Sample different sorts of wood grown in the forest reserves of Gōdāvari, Kistna and Vizagapat districts may be collected and sent to experts in Calcutta or Dundee for opinio as to what wood will suit and stand for bobbins on jute spinning machines.

Q. 40.—Jute grown in Government agricultural farms for experimental & industri purposes must be sold to jute mills in the Presidency at cost price or at favourabl rates

Q. 41.—Industrial development is not progressing satisfactorily [illegible] in spite of vast resources available in India owing to heavy land taxes, [illegible] and ground-rents. The land tax must be reduced, water-tax on mills [illegible] be cancelled; ground must be left free or at some nominal [illegible] the capitalist to float the industry with immunity.

Q. 48.—There are, at present, only three jute mills in this Presidency, one managed by the South Indian Industrials, Chittivalsah, Vizagapatam district; another known as the Krishna Jute and Cotton Mills Co., Limited, Ellore, a joint-stock company under my management as Secretary and Treasurer of the concern. We get all our jute from up country markets, other districts, and presidencies. The jute crop is not largely grown in this district as the ryot is always used to grow only staple food crops though there is every facility to grow jute on a large scale. To encourage the ryot to grow jute, the only inducement is to give out waste lands for experimenting thereon with jute crops free of taxes, or for nominal rent, and water tax free, or better still if such lands are kept under the control of the State. Jute cutting experiments should be made by responsible officers of Government of the rank of Tahsildar or Revenue Inspector. It is only in this way that jute can be grown in this district by the Government to the advantage of the Government and the encouragement of the land holders and mill-owners.

Training of labour and supervision.

Q. 49 *and* 50.—Day schools have been opened, but the workers, who are illiterate, cannot be induced to attend schools systematically in spite of many facilities opened out for them. Such day schools will be useful for the young operatives of industries if they are placed under the control of the Department of Industries, as the operatives benefit more by industrial education than the mere study of the 3 R's.

Strikes among mill hands are every day occurrences, and for regulating labour strikes, the Police Department may be ordered to post a Sub-Inspector and a batch of constables to visit each mill once in the morning and once in the evening to watch the movements of the workers, and to take prompt action in regard to any disturbances likely to crop up detrimental to the interests of the industries. We have had many strikes in our jute mills, and police aid could be had only after a good deal of correspondence. It was a day after the fair that the police aid could be secured. In Calcutta, Police Inspectors walk round the jute mills daily to see that the workers behave properly, and cause no strike nor any trouble. Magistrates and police officers take no notice of the complaints made by mill owners, and hence labour strikes are common in this place. When the Government are levying large land, water, and income-taxes from the mill owners, I think it is their bounden duty, as public servants, to look after the safety of the industries, and punishing the strikers and ringleaders. The Government seem to suppose that it is not their duty to safeguard the interests of the industries which alone contribute the lion's share to the national and Government wealth, next to agriculture.

Mechanical engineers.

Q. 54 *and* 55.—The law must be uniform for every province, that none but qualified mechanical engineers must be put in charge of boilers and prime-movers. The present set of mechanical engineers are mere *a*, *b*, *c*, darians, cannot spell words, and cannot put two words grammatically together. It must be made compulsory that a student who wishes to study mechanical engineering should be at least a matriculate of any one of the Indian Universities with sufficient knowledge of English.

Official organisation.

Q. 57.—An Advisory Board, consisting of the head of one of the leading industries in the Presidency, is necessary.

Q. 60.—The office of a Director of Industries is a sheer waste of money. He is only a figurehead, at present, with practically no knowledge of any industry whatever. Such a man is only a clog in the wheel.

Technical and scientific departments.

Q. 70, 71 *and* 77.—Experts in any one or more branches of industries may be employed by the State for each Province. They should visit such places where their services are required to enlighten those interested in starting any industry with the benefit of their technical and practical study and experience, and to aid them in every possible way in starting the industry successfully. Such experts will be paid by the Government of each province, but the parties that seek the expert advice must bear the travelling and other charges of the expert. Provincial control will be quite sufficient. If necessary the technical and scientific experts may be permitted to study conditions and methods of other countries.

Reference libraries.

Q. 79.—Reference libraries are absolutely necessary for studying the various aspects of industries materially and financially and every province must be provided with works of reference for experts and organisers of industries to study whenever necessary.

Commercial intelligence.

Q. 84, 85 *and* 86.—Industrial and trade journals are necessary for the dissemination of commercial and industrial information, and these journals, though issued in English, must be translated into the vernacular of each province and district and such translations published in the District Gazettes.

Railway [illegible]

Q. 98.—The present rate of railway freight is simply exorbitant notwithstanding the dearth of waggons at each station on the Madras and Southern Mahratta Railway line.

Sidings from the main lines must be provided for each jute industry to facilitate prompt receipt and despatch of coal, oils, jute and the export of bales. Unless facilities for traffic are made, the trade will be paralysed, and I have already expressed my views in a communication to the Secretary of the Railway Board, Simla, on the dearth of waggons which it may not be out of place to quote here briefly.

"Our commercial interests in this part of the Presidency are more or less dependent on the Madras and Southern Mahratta Railway. Ellore is an important traffic station on the line. Rice and gunny bales are very largely exported to the southern districts and to Malabar by the Madras and Southern Mahratta Railway and South Indian Railway.

Of late, there has been a regular dearth of waggons at this station with the result that thousands of rice bags are allowed to rot in and out of the railway station, in mountain heaps, exposed to sun and rain. The Madras and Southern Mahratta Railway could not meet the demand, because they are managers of narrow gauge.

When the line was under State management, there was no such complaint and waggons were available at all times over and above the requirements so much so that the commercial or industrial interests of this part of the Presidency were never at stake.

From our every day experience of the railway systems, we are of opinion that the management of railways by the State is more advantageous and conducive to the best interests of the commercial community.

The management of the narrow gauge and broad gauge being now in the hands of the Madras and Southern Mahratta Railway they are unable to adjust one with the other, and hence their inability to manage the line, and provide waggons enough to carry on the traffic of the broad gauge. Hence the necessity for transferring the broad gauge to the State management where the treatment will be more liberal. There will then be no dearth of waggons, no inconvenience to traffic, no damage to merchants, and the State along with its people will enjoy many years of prosperity as before."

Concessional rates must be allowed according to the extent and importance of traffic of each station, as these are allowed at present only to seaport stations entailing upon the merchant additional heavy expense of paying from the seaport station to the place of destination.

Distribution of waggons is not properly done by the Madras and Southern Mahratta Railway as stations of minor importance are given more than the required number, while those of greater importance have not been given even the required number. Hence the congestion of traffic on this line. Under the State management, I am sure such irregular and unequal distribution of waggon would never be permitted.

Q. 110—*Jute industry.*—For encouraging jute industries, the first important item to be looked to is to get the raw materials in large quantities in and near the industrial area. At present we are getting the stuff required for our jute mills from Cuttack, Vizianagar and other districts at great expense. All this can be avoided if jute is grown extensively side by side with paddy crop. To encourage the ryot to grow jute, Government may be pleased to grant waste lands to the ryots, free of land or water tax for experimental purposes, or open experimental farms at the expense of the State to grow jute and sell the stuff to local industries.

Jute growing lands.—Kolleru lands in the Kistna district are always under water unfit for growing wet crops. But jute is largely grown in the valleys of Hugli and Brahmaputra in knee-deep water. Government may be pleased to experiment with Calcutta jute seed in the flooded areas of Kolleru on the same methods and principles that it is grown in the valleys of Hugli and Brahmaputra in Calcutta. After the jute has been removed, Government may allow the ryot to grow any second crop paddy or other wet crops, if he chooses. This will certainly induce the ryot to grow jute in large quantities on the flooded areas of Kolleru.

ORAL EVIDENCE, 24TH JANUARY 1917.

Hon'ble Pandit M. M. Malaviya.—*Q.* When was your mill started?—*A.* Ten years ago.

Q. Has it been giving you good profits during these years?—*A.* I have been getting profits during the last two years.

Q. Why did you not earn any profits in earlier years?—*A.* Owing to the dearness of jute and the cheapness of gunny.

Q. You suggest that in order to encourage such industrial enterprises Government should reserve some funds in the industrial, commercial or agricultural banks with a view to offer facilities to the organizers and promoters of industries for taking loans free of interest or at a low of interest, to be re-paid on some specified dates. Is there any bank in existence in your district to help industries?—*A.* Only the Madras Bank.

Q. You want an industrial bank?—*A.* Yes, with cheap interest on the security of building and machinery of the mill.

Q. Have you got any co-operative credit society in your district?—*A.* No.

Q. Not even one?—*A.* No.

Q. Not even to help agriculturists?—*A.* No.

Q. Except this branch of the Madras Bank there are then no other banking facilities in your district?—*A.* No.

Q. Have you not got any wood in your district which you can suggest for the making of bobbins?—*A.* No. The Forest Department must help us.

Q. You say industrial development is not progressing satisfactorily owing partly to heavy land taxes?—*A.* Yes.

Q. Is the land tax pressing heavily upon the agriculturists?—*A.* Yes.

Q. You think that in order to induce cultivators to grow jute land should be given them free of rent?—*A.* Yes. I mean waste lands.

Q. Your remarks don't apply to land generally?—*A.* No.

Q. You don't wish that ryots should grow jute on lands on which they sow food crops, but you suggest that they should grow jute on waste lands?—*A.* Yes.

Q. And if they were given waste lands on easy terms would you insist on their growing jute only, or would you leave them free to grow whatever they liked?—*A.* No. I would insist on their growing jute only.

Q. Would you like the Government to introduce some compulsion regarding your own business?—*A.* No. I say this only to improve the industry, because it is a useful industry.

Q. You say your labourers do not attend the day schools that have been opened?—*A.* That is a very great difficulty.

Q. How many day schools have you got there?—*A.* We have got one factory school.

Q. And your labourers don't take advantage of it?—*A.* No. Even if you give them pencils, slates, papers, etc., they won't go. If you press them they stay away.

Q. Can you tell us why they don't go to the school?—*A.* Because they don't care for it. They want to get money only.

Q. What is the instruction that you impart in your school?—*A.* There is a compulsory rule that those who work in the morning should attend the school half a day in the evening.

Q. But in addition to reading, writing and arithmetic, do you teach them anything connected with the industry?—*A.* We teach boys who are below 14 years of age reading writing and arithmetic. The boys who are below 14 only attend half a day in the factory.

Q. Even the boys who are below nine don't attend the school?—*A.* No.

Q. Why?—*A.* I do not know.

Q. You say that in Calcutta Police Inspectors walk around the jute mills daily to see workers behave properly and cause no strike nor any trouble. Is this statement based on what you have seen or on what you have heard?—*A.* I have never seen it personally, but I heard from the engineers of the Calcutta mills. If you say anything to the coolies they will go on strike and that is the difficulty in labour.

Q. Is this difficulty growing?—*A.* Yes.

Q. Is there emigration from your district?—*A.* Yes. Moreover, these people are not dependent only on mills. They go away to the agricultural business or some other business.

Q. But many of them migrate outside your district?—*A.* We imported at first from Calcutta and other places, and we taught our people and they learned everything, but they are now going away though we pay high salaries. If we say anything they strike.

Q. Is that not a healthy sign? They want to be treated better?—*A.* We pay them better and we treat them better also. Whatever they want we ought to give.

Q. You are not able to tell us why if you treat them better and pay them better they should not be willing to serve?—*A.* If you remove the leaders the labourers will strike

Q. The labourers as a body are not to blame but some few men among them?—*A.* Yes.

Q. And they do it for their own selfish purpose?—*A.* Yes.

Q. You say that the Director of Industries is only a figure-head at present with practically no knowledge of any industry whatever. You don't suggest the abolition of the post, but you want a better man?—*A.* They never advise us nor show us anything. Industrial men should advise us when we go wrong I have never seen the Director tour in my district.

Q. Or any of his subordinates?—*A.* No.

Q. You suggest that experts engaged by Government should visit such places where their services are required and aid in every possible way the starting of industries successfully?—*A.* Yes.

Q. In view of the slow progress of English education in your district would it be essential that these experts should talk to your men in the vernacular?—*A.* Yes.

Q. And the vernacular only?—*A.* Yes.

Q. If they don't know the vernacular, they will not be able to help your people much?—*A.* Even if they speak in English, it can be translated to the people. We only want him to put us in the right path.

Q. You say that the present rate of railway freight is exorbitant and you advocate that the State should take up the management of the Madras and Southern Mahratta Railway. Since when has this company been in management of this line?—*A*. Since six years. Before that it was in the hands of the Madras Railway and their management was good. But after the Madras and Southern Mahratta Railway came they never supply us waggons. While the Bengal-Nagpur Railway supply us any number of waggons, Madras and Southern Mahratta Railway never supply a sufficient number of waggons.

You say from your everyday experience of the railway system that the management of the railway by State is more advantageous to industry?—*A*. Yes. They will give us any amount of facilities. The railway companies would not allow us to build any godowns nor would they supply even tarpaulins. We asked them to permit us to construct our own waggons and sheds near the railway station. But they would not allow. I asked them to allow me to run my waggons on their line, but they said that the Indian Railways Acts did not allow it. We said we would buy waggons and make them over to the railway in order to provide facilities for our goods. But they refused.

Q. What State Railway have you had experience of?—*A*. We had the East Coast Railway and we had none of these difficulties. Now we have Madras and Southern Mahratta Railway and they are narrow gauge people and they cannot supply waggons. Bengal-Nagpur Railway is supplying any amount of waggons.

Q. You also think that there should be better rates given to you in comparison to seaport stations?—*A*. They are always giving concession rates to seaport stations. Ellore is midway between Bezwada and Cocanada, but Ellore has not got concession. If they give concession to one station they ought to give concession to other stations also.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. What wages do you pay to your labourers? —*A*. A female labourer gets Rs. 3 weekly, a weaver gets Rs. 5 a week and a spinner gets Rs. 3 a week. An ordinary cooly working in the mills gets As. 6 a day. We pay anna 1 and pies 9 to young boys below 14 years. A man gets As. 6 and 5 during cultivation seasons.

Q. Do you think a man who works in the field at As. 6 will be willing to go and work in the factories at As. 7?—*A*. Agricultural work can be done by any one but not the mill work.

Q. Are your workers cultivators of your own districts, or labourers imported from other places?—*A*. They are ordinary coolies.

Q. Suppose they go on strike and you close the mill for ten or fifteen days will they come back?—*A*. They won't care and they go to the town and work there.

Q. Is your factory a limited company?—*A*. Yes. I am Secretary and Treasurer. We are working on commission system and our commission is 9 per cent on the net profits earned by the company.

Q. Do you want Government to purchase jute for you?—*A*. No. We want to introduce jute cultivation. The idea underlying my suggestion is to grow jute under Government supervision and to sell jute at cost price and we will buy jute from Government because our industry is a local industry. We want local jute and we want Government to grow jute and give it to us at cost price.

Q. Don't you think it will be unfair to the jute industry?—*A*. I want them to introduce it to the ryots and to enable them to learn that it is a profitable thing.

Q. Do you want money to be given by the industrial banks and agricultural banks to the people without interest?—*A*. Yes, until they are taught.

WITNESS NO. 212.

MR. V. ARUNAGIRI NAYUDU *of C. Abdul Hakim & Co., Skin Merchants and Exporters, Madras.*

WRITTEN EVIDENCE.

I have some experience regarding the raising of capital in connection with the Madras Electric Tramway Company, and a company for the manufacture of glue out of the hides fleshings, and also of a tanning industry wanted to be started and worked on joint stock lines by one of my friends some years ago.

I do not think that there is much difficulty in raising the capital necessary for new industries.

We see Indian capital is readily attracted towards co-operative societies, postal savings banks, railway and municipal debentures, mining shares and other such investments. If the public are only convinced of the safety of a concern and the prospects there may be for the articles manufactured, and confidence in the competence and ability of the directorate, private capital is sure to be attracted.

Mr. [illegible] Nayudu.

The people that are ready and willing to invest in new industrial ventures, are the English-educated men and persons engaged in learned or literary professions, such as vakils, doctors, etc., as well as Government servants, schoolmasters; and others who get fixed incomes.

The non-English knowing men are generally agriculturists, traders, merchants or those engaged in some industrial or commercial work. Such men have no faith in joint stock companies and are not willing to risk their money in new industries, and enterprises about which they have no knowledge, or the success of which has yet to be demonstrated. These people are content to invest their moneys in the development and enlargement of the businesses in which they are actually engaged and which are yielding them a fair return.

On the other hand, the English educated men, by virtue of their Western culture, have acquired a broader outlook and they are everywhere anxious to see the development of the Indian arts, trades and industries, so that this vast country may take its proper place among the countries of the world. They have thus created the swadeshi spirit and have started numerous swadeshi companies, banks, insurance companies, trading associations and the like, and are naturally anxious to be on the directorate of the enterprises in which they have invested their money. But unfortunately, they have not the requisite business knowledge and commercial training, and have no experience of the troubles and difficulties incidental to commercial and industrial pursuits and enterprises, and are sometimes not able to get over red-tape habits of thought and action.

They are also generally unwilling to pay for first-class men to guide and control the works, and imagine that they can get on well enough with cheap foreman or maistries, and ill-paid subordinate staff.

The result of all this is the failure, sooner or later, of many a swadeshi venture, bringing about discouragement to others who may wish to take to industrial pursuits and careers. Such failures make people lose faith in the suitability and efficiency of joint stock enterprise under present Indian conditions.

Doubtless there have been many failures due to fraud on the part of the individuals in charge of the works, or want of honesty even on the part of the Directorate, but taking a careful view of the whole, I am convinced that most of these failures are due mainly to (1) imperfect organisation, (2) inadequate capital, (3) want of business experience or too much red-tapism, (4) absence of necessary technical guidance and help, and (5) want of Government support.

Government assistance.

It is therefore absolutely essential that the Government should give financial amongst other help to existing and new industries, as Government support and control will create confidence in the mind of the public.

I think all the forms of aid enumerated under question 5 will have to be adopted as may be found suitable and applicable to various industries, according to their relative or individual needs or requirements.

In the absence of protective duties on certain foreign imports, grants-in-aid, and bounties and subsidies to enable such goods being produced locally will be essential. In most cases the methods 3, 4, 5 of question 5 will generally suffice.

The guaranteed Government purchase of products, when they are up to standard, is one of the best and most necessary forms of encouragement and support that an industrial concern can be given, but I think such purchase must be continued not for a short time but till such goods are being produced commercially and are available in the market for purchase.

The Government should exercise its control through a Director with defined powers and duties, whose duty it will be to visit and inspect the concerns and factories that are receiving Government aid. He must have power to take such action as may be necessary, as in the case of co-operative credit societies, to ensure the safety of the industrial concern and maintain the confidence of the public therein. There should be also periodical audits by the Government auditors. The internal management should be left entirely in the hands of the directors of the concerns.

The above two checks should be enough to ensure proper working of the concerns on safe and progressive lines, and to prevent extravagance or recklessness on the part of management.

I have known personally of two such factories organised and worked by Mr. Chatterton. He boldly ventured and exploited the possibilities of chrome tanning and of the aluminium industry, with his commendable energy in the cause of the Indian industrial development.

He had no practical knowledge of these industries and there were no trained workmen [illegible] to assist him in the work. The process had to be gathered and studied from [illegible] pamphlets and journals, and he had to get what help he could, from [illegible] engaged in the tanning trades and in the metal industries. Even under such [illegible] he made them successful. His scientific knowledge helped him a good deal [illegible] two new industries, which are being taken up by many private concerns. The Madras Aluminium Factory and Mysore Chrome Leather Factory may be mentioned prominently in this connection.

In order to make pioneer factories successful concerns, specially qualified men and technical experts of best education and experience should be employed, and Government should give every possible help to them.

The pioneer factories should be worked till it is found that there is no prospect at all of their being worked as paying concerns. Under previous study and careful selection of the industries or processes to be tested, such failures may not occur.

When the pioneer factories are beginning to yield the ordinary market rate of interest for the capital that may be invested, they should be entrusted, as working concerns, to private capitalists or companies, giving preference always to indigenous capitalists and concerns. The Government must also continue their help till they are able to work without any outside help.

I am generally against the principle of Government making a monopoly of the results of the success of pioneering experiments. Such industries must be allowed to be taken up and worked by private concerns, under proper safeguards, such as Government supervision, guidance or control, and with Government help as long as necessary; but when an industry is a very large one requiring a large amount of capital and an extensive organisation which is beyond the ability and scope of private individuals or joint stock companies, it can be taken up by the Government and worked just like Telegraphs, Railways, Salt or other departments are being worked, for it will then become a source of income which makes it worth while, in the tax-payer's interest, to maintain and work it as a departmental concern.

It is also to be noted that in conducting a business as a department of Government, there is a likelihood of there being no sufficient incentive to make improvements or effect economies, as when the industry is carried on under competitive conditions.

There is lurking fear amongst Indians that the pioneer factories are likely very often to drift into the hands of powerful rings or combines, and that the people of the country themselves may not get that benefit which the Government itself wishes to secure to them. It is therefore desirable that endeavour should be made to get local or Indian concerns to take up such work, the Government giving their help as long as needed.

No limitation or restriction should be placed on new industries, or Government aid denied to such enterprises, on the score of their clashing or competing with any established external trade. On the other hand, the Government must help by every means in its power not only by advice and technical and expert guidance but also financially. India must be free to develop its resources without check or hindrance on its own lines, and be allowed to manufacture articles for consumption for its own needs, if not for foreign export. I do not think that any established external trade has permanent vested interests for all time, so that the Government should desist from aiding the establishment, working or improvement of trades that would benefit India. If it is meant (by question 14) that India should be allowed not to compete with England, or should only manufacture those things that England would allow, then there is no hope for India, to rise and take its place, among the self-supporting countries of the world.

Technical aid.

In order to develop industries and make India a manufacturing country, manufacturing articles at least for its own needs, instead of depending upon other countries for its necessities, it is absolutely essential to have research institutes the duty of which should be to find every available scope for the various kinds of raw materials found abundantly all over the country, but which are being now exported in enormous quantities to foreign countries, to be worked there and returned at ruinous cost and disadvantage to Indian people.

India being such a large country with differences in climatic and other conditions, one single research institute for all India will not be enough. There must be a central institute which should have a number of most experienced specialists for all branches of industry. It should be fully equipped with the latest appliances and an up-to-date chemical laboratory. It should also have a small factory fitted with necessary machinery, attached to it.

There is no use of having second and third rate men in charge of such an institute. It would not be too much to give a tempting pay to a number of specialists and technical and trade chemists of international fame to come out to India for service therein. Anything from two thousand rupees to even five thousand rupees a month, I should not consider very high, if we are to look to the great benefits that would accrue to the country by the labours of such an institute under such specialists. One single idea or one discovery or invention alone may be worth all the money spent thereon.

In addition to the central institute for all India, located in some important and easily accessible centre, there must also be provincial research institutes, located one at least in each of the bigger provinces. The chief central research institute [illegible] look after the special industries of the province in which it may be located. The provincial research institutes would be on a smaller scale than the chief institute and will have a greater and much larger proportion of qualified Indian technical chemists and industrial specialists on the staff, working under one or two eminent experts got out from foreign countries.

All these institutes should be independent of each other, but subject and responsible to a special officer of Government, a Director-General of Industries, who would be directly subordinate to the Government of India, and responsible for the development and progress of the industries of the country. There should also be a Director of Industry for each province. The professors and the assistants of all the research institutes may meet together in consultative conferences twice or thrice a year.

The specialists and their assistants, in addition to what they will be doing in their own institutes and laboratories, should also be made to visit industrial concerns in the country, and watch carefully the methods of work and the practice followed therein, and try to improve the working in the directions which may suggest themselves under such observation. The cost of chemicals and materials and the labour necessary for these experiments towards improvements, could be easily collected from the factories themselves. The proprietors would be only too willing to pay for the same, when they see that by these improvements economy is effected, labour saved and large quantities and better qualities of goods are turned out.

The same thing could also be done by demonstration factories. Specialists in charge of these factories may spend some of their time in the above class of work in private factories, which may ask for their services, a reasonable sum being charged for such services.

In lending the services of technical experts to work in private factories the services may be subject to the express condition, that any important discoveries and improvements effected would be the property of the Government to be used for the public benefit, as long as the giving of such information will not be to the financial detriment or loss of the private factory.

Each provincial institute may take in paid apprentices or scholarship holders, who should undergo training in both theoretical and practical work, so that they may, in time, take independent charge of research institutes and technological schools.

The paid apprentices or scholarship holders may be taken from the best passed out men in engineering, medical and other technical colleges in India, and from those who have passed with distinction from the science branch of Arts colleges. This will also give an impetus to scientific studies in India.

These men, when thus trained will find considerable scope for the utilisation of their technical and expert knowledge and may find suitable employment as heads of concerns which local and village enterprise may start for the development of industries. The Government would thus be able to provide suitable careers for their trained experts, instead of merely leaving them unprovided for.

I would suggest that greater attention should be paid by provincial research institutes to the development of what may be called cottage industries or village industries. These are generally minor industries which could be carried on by individuals without any very large expenditure for machinery and appliances.

Every village requires carpenters, blacksmiths, potters, chucklers, weavers, dyers, goldsmiths, oil-mongers, etc. Therefore the industries connected with these professions should be taken and worked and improvements effected in them on up-to-date western lines by the Government.

The industries that may thus be taken up and for which there will always be local demand, and for which raw materials could also be found, are numerous. They would for instance comprise:

(1) *Oil industries.*—Extraction, bleaching and purification of oils; manufacture of toilet, medicinal and industrial soaps; varnishes, paints and linseed-oil preparations.

(2) Glazed pottery, porcelain ware, crockery, improved kitchen utensils, and glassware.

(3) Fibre industry comprising manufactures of cordage, ropes and twines; brushes from coir, palmyra and other fibres.

(4) Cement-bricks tiles, and floorings for house building, terracotta ware, fire bricks.

(5) Manufacture of pharmaceutical drugs and extracts, and medicinal preparations from indigenous raw products.

(6) Bleaching powders, manures and fertilisers, insecticides and weed killers.

(7) Preservation and canning of fruit, manufacture of health food and food-stuffs from bananas, yams, tapioca, arrow-root and other similar agricultural products.

(8) Smoking mixtures and other tobacco preparations.

From the statistical abstract of British India it will be seen that out of a total population of 315 millions, 28 millions live in villages and 227 millions are employed or dependent on agriculture while only 35 millions are engaged in industries or are supported by them. The actual workers in industries are only 17½ millions.

These figures show the importance of agriculture so far as India is concerned and the dependence of the people of this country on agriculture.

The industries connected or bearing on the improvement of agriculture and the betterment of the agricultural classes should take an important position in the activities of the Industrial Department also. Many of these industries, I have already mentioned by way of example in the list of village industries.

Forests being under the sole control of Government the utilisation of forest products so vast and varied, for the manufacture of various commodities needed in this country, should be taken in hand by the Department of Industries. It would be easy for Government to start factories for the manufacture of these articles, as pioneer industries, or to hand these to private enterprises with suitable concessions and under Government help and advice.

Indian stipendiary students trained in research institutes can very well be employed in all the works.

It seems to me that there is no necessity to have any permanent provision for research for special subjects in the United Kingdom in addition to arrangement made for research in India, apart from what the Imperial Institute in London already provides.

It would be easy always to get advice and aid on every matter on which the Indian Research Institute may require such advice and help or special experiment.

The difficulties that may present themselves will necessarily be extremely varied in nature and would often need a variety of experts to solve the same. To keep a permanently paid staff of a variety of specialists and experts would be decidedly out of the question, as it will involve an enormous charge on Indian revenues. When any difficulty arises the research institutes in India can always refer it to the special kind of experts who are conversant with the particular class or kind of work, and pay for the same in each case.

Assistance in marketing products.

I have no experience of the commercial museums in this country, but I have seen a number of ordinary museums in various towns in India. The Victoria Technical Institute in Madras is the only one of a commercial nature which I have known. Other museums in this country also serve to give some knowledge of local arts and industries.

I have visited a number of ordinary museums and commercial museums in other countries and many in Japan and a very fine one in Philadelphia and I have also visited the Franco British Exhibition in London, and I have taken part in organising and getting up of an Industrial Exhibition in connection with the Indian National Congress. These museums play a very large part in helping trade and industry, and in bringing together manufactures, buyers and distributors to help one another. It would certainly be advisable to have such museums in all district centres also, where the special industries of the district may be dealt with.

The commercial museums must arrange and show raw products and various processes and stages in the manufacture of articles from them. The methods of manufacture must also be illustrated. There must also be attached a bureau of information to assist those engaged in trade and manufacture. I should also suggest small itinerant exhibitions of domestic and foreign goods which could be manufactured in the country as well as improved tools and appliances.

Exhibitions should be popular in character to make them financially workable; at the same time they should aim at bringing sellers and buyers into contact.

It is a common thing for foreign manufacturers to send their assistants or representatives with various kinds of goods neatly arranged, to be exhibited as samples to likely customers, and secure orders thereon. In the same way commercial sale agencies would be extremely useful to popularise Indian manufactures. The Indian Co-operative Swadeshi Stores in Bombay has been doing very good work in this way. It has been an eye-opener of the various articles manufactured in India.

It is absolutely essential that in order to encourage industries of the country that there should be a list of principal imported articles and those of Indian origin as well which the principal Government departments use. The list should be available for sale and the articles themselves should also be exhibited in commercial and other museums so that people may know what goods are necessary for Government requirements and produce them locally, with a reasonable certainty of securing Government patronage. I should insist on Indian Governments purchasing swadeshi or Indian made articles, in preference to foreign or imported ones, whenever such are available and come up to a fixed minimum standard or quality.

It is a common practice for Indian mercantile concerns and merchants, both big and small, to employ a number of assistants whose business is to constantly visit centres of trade and industry in the interior districts. These men have to get acquainted with the various merchants of the place and note their peculiarities, their wants, and requirements and the trade openings and possibilities for the benefit of the firms which they represent.

I myself have thus been to foreign countries more than once—United States of America, California, Canada, England, France, Italy, China and Japan. [illegible] have enabled our firm to build up our business and work it up steadily in [illegible] and powerful competition. Our friends from other countries have also been tempted to visit us and get into closer personal acquaintance and strengthen mutual business relationship so much so that they introduce us to their friends in other countries as well.

Japanese representatives have been of late coming in numbers to India to catch what trade there is for their country. They have thus been already able to flood the country with numerous articles hitherto imported from Germany, Austria and other Western lands, and to defy the competition of British and other Western made goods.

American consuls who are in the Presidency centres in India are regularly sending weekly reports to their country of the requirements of the Indian people. Their bulletins and consular reports contain every information of any importance that may be useful to their merchants and manufacturers for catching the trade of India. Imports of American goods are also thus growing every day. It is therefore quite evident that if there are Indians who necessarily know the country and the manners and customs and habits of their own countrymen better than any foreign men can, they would be able to render a great deal of help when sent out as commercial attaches or representatives to foreign countries.

These attaches will have to study the peculiar needs of the country they are exploiting and its manufactures and industries and gather information with regard to the various uses to which raw materials, so largely imported by these foreign countries are put, and give full information to Indian enquirers and manufacturers in India. They may be appointed to hold office for a term of five years. I do not think that any University qualifications are necessary for them. It would be enough if they have a good general education and some business experience which would enable them to clearly grasp the meaning and trend of what they see and make proper inferences therefrom.

Special enquiries would no doubt be useful in special cases, but the results would not be of much value or advantage to the country unless Indians also are allowed to be on these commissions of enquiry.

I do not think that provinces in India itself should have trade representatives in other provinces.

I have not found any library in Madras where I could get trade and commercial information, more particularly about foreign countries. A good library of all books bearing on industrial and technical and scientific subjects and on actual methods and processes of manufacture, must be established, at least in the principal Presidency towns and in important industrial centres. They may be attached to the existing colleges or to the offices of Directors of Industries. Libraries.

Trade directories and annals, reports of Chambers of Commerce, Indian as well as foreign consular reports, technical and trade journals, select descriptive catalogues and price-lists relative to various industries, should also be received and kept in these libraries. The librarian must be a man of good education so as to be able to study and digest information and make it available to the public.

The chief industry with which I am connected is the tanning of sheep and goat skins and cow and buffalo hides, and the export of the same to foreign countries such as England, America, Japan and Australia. These are the countries with which we are doing business regularly throughout the year. Connected with this is the export of dry and wet-salted and pickled-goat and pickled-sheep skins, and dry hides to all these countries. Skins and hides

This trade may be said to be mostly in the hands of Muhammadan merchants who have made it their calling, or vocation from their youth.

The industry requires considerable amount of capital and is chiefly financed by foreign European merchants through local agencies and Exchange Banks. Letters of credit are also put up through these banks. English, European and American firms thus make large money advances to the tanners and skin merchants engaged in the business, in order to secure their output for sale in Europe and America. Australia and Japan are also coming in to do this.

A very large number of men is engaged in various operations connected with the industry, and these have to be men with special experience and training, and technical knowledge and dexterity. The children of these workmen work with their parents and relations in the factories and thus get the requisite training, from their very youth. As they grow older and older, they are more and more competent and become fit to be entrusted with important work, and the supply of necessary skilled labour is thus kept up.

The men intended for the position of upper-subordinates, managers, and those who would also eventually become proprietors or share holders in their concerns, do also [illegible] very good training specially fitted for such positions, under the efficient and [illegible] system of training in vogue in this trade.

Madras is the best place for effecting improvements in the tannage of skins and hides. Tanning is one of the chief and extensive industries carried on in this presidency. There are about 400 tanneries in this Presidency and about 100 of them are right in the presidency city itself.

Bombay and Madras are the only Presidencies in which the tanning industry flourishes—Madras being more important of the two.

The number of tanned goat and sheep skins exported annually to foreign countries comes up to be about 200 lakhs, and only about one fourth of it is tanned in the Bombay Presidency. The "prime" and finer tannages are chiefly confined to Madras, and in "good" and "ordinary" brands which constitute the bulk of Bombay manufacture, the products are not equal to the corresponding goods produced in the Madras Presidency.

The number of tanned-cow and tanned-buffalo hides exported out of India come to over 30 lakhs, almost the whole of it being likewise tanned in Bombay and Madras.

Tanned-buffalo hides, out of this number, are about a three lakhs at the most. In the matter of these also Madras takes the lead.

The share that other parts of India take in this industry, is the collection and export of raw goat and sheep skins and raw hides. Most of this export has hitherto been in the hands of German firms. Thus Madras may properly claim to be the locality wherein to conduct improvements and try new processes and improved methods.

Pioneer and demonstration factories should be established exclusively for the skin industry, and should be under the charge of competent first-rate foreign trained experts who possess a thorough knowledge, theoretical and practical, and who have also had training in factory work, as well. The following are some of the articles that may advantageously be produced, as they will always find a ready demand and sale, not merely for local consumption but also for export.

The tanning as carried on in this country at present is fairly satisfactory and meets the needs and requirements of the importers and consumers in the foreign countries to which these skins are sent. Nevertheless, considerable improvement is possible. There is a good deal of waste in labour and in the use of curing and tanning materials, such, for instance, as salt, myrabolams, tanning barks, tallow, etc., needed in the works.

In methods and manipulations also improvements may be effected. For instance the introduction of tanning drums, paddle wheels and improved tools and appliances, and small changes in the construction and the position of tannery pits and vats, etc., will be of much use and would save considerable amount of labour, improve and lighten the work and bring about a saving in the cost of manufacture as well.

Progressive tanners who wish to enlarge their out-put or those who want to manufacture superior leathers, will find they can do so by the introduction of a few machines.

I have had the opportunity of visiting a number of tanneries and curriers establishments in various parts of the world. I have seen many such establishments in San Francisco, Boston, New York, Philadelphia, Chicago, Baltimore and other centres of this industry in United States of America, and factories in Montreal and Toronto in Canada, as well as some in England, France, Italy China and Japan.

From what I have seen of the various kinds and classes of leathers manufactured there I do not see any reason why Indian tanners should not produce tanned and dressed skins and hides as good as those manufactured in Europe and America, except want of technical advice and training.

The things that I would suggest as fit for pioneering and demonstration are the manufacture of chrome-leathers of various kinds such for instance as (1) glassi-kid from goat skins, and various kinds of fancy leathers from goat and sheep, (2) willow calf and other classes of upper-leathers for boots and shoes from cow hides, enamel and patent leathers, (3) manufacture of sole leathers out of heavy cow and buffalo hides, (4) harness leathers, (5) belting leathers suited to the requirements of mills and factories in India, (6) roller skins for mills, and ordinary chrome leathers useful for various other local needs such as mushk-bags and pakalies for carrying water and other liquids, (7) chrome leathers for water bailing bags used in irrigation.

Combination tannages too have a great future and deserve every attention. The production of improved bark-tanned leathers for consumption in various parts of India, and for export in a better finished form to foreign countries, deserves attention.

The manufacture of leather goods out of the leathers manufactured in India is another important line of work and should also be taken up specially in hand. The manufacture of tanning extracts from various tanning substances so abundantly available and so largely used by the tanners of the presidency will be another useful industry. All these will give scope to the work of pioneer and demonstration factories and give room for the employment of educated young men and stipendiary students who have undergone special training in India or foreign countries in leather industries.

ORAL EVIDENCE, 24TH JANUARY 1917.

Mr. C. E. Low.—*Q.* You say that there is a lurking fear amongst Indians that pioneer factories are likely very often to drift into the hands of powerful rings or combines. What do you mean by that exactly?—*A.* I mean that some of these concessions that have been given have ultimately gone to other people, to rings. For instance, the Travancore Government gave some concessions to Mr. Schomburg who sold it to somebody else and then it was sold to a London Syndicate. People of the country have had no advantage from it.

Q. I quite admit the disadvantage that might happen in the case of Travancore. Do you think that there is a popular impression that if a small pioneer factory is started a ring might get hold of it?—*A.* That is the impression in the country.

Q. Do you think that it is an undesirable state of things?—*A.* I do not think it does matter so long as the idea is to develop Indian industries for the benefit of the Indian people. It would be better to see that Indian capital gets the benefit of it.

Q. You would not mind if there is a combination so long as it is Indian?—*A.* Certainly.

Q. You say "If it is meant (by question 14) that India should be allowed not to compete with England or should only manufacture those things that England would allow then there is no hope for India to rise and take its place among the self-supporting countries of the world."

President.—*A.* The only meaning of the question is this. There are some people in this country, Indians and English, who are now getting a living by dealing with external trade. The question is whether the Government should aid a new enterprise that might damage an external trade on which so many people of the country depend for their living?

Sir F. H. Stewart.—*Q.* If an export duty was put on hides and skins that might affect your business as an exporter? That would affect you as a tanner?—*A.* After all we are finding the same difficulty. We cannot help it.

Mr. C. E. Low.—*Q.* It cuts only one way, that is the poor ryot?—*A.* I do not know if the poor ryot suffers so much as the middleman. We sell it at a particular price and the men will then ask us to pay more. He notices the price and he would not sell it to us. It is the middleman that suffers.

Q. You would have a special local department for the development of industries?—*A.* Yes. The local Director of Industries will be always subject to the influence of the Government.

Q. You mean that the control of the Director-General will be only on technical points?—*A.* Yes.

Q. What is your idea about the Indian Commercial Intelligence Department? Do you think a Department of Commercial Intelligence is required in India?—*A.* I think the Director-General of Industries will be able to do it with the help of his department.

Q. Industry is one thing and commerce another. Industries are making the thing and commerce is disposing of the things afterwards. Would you put both these things in the same hands?—*A.* What I mean is that the Industrial Department could deal wih the technical portion of the thing.

Q. Supposing it is a question of collecting commercial intelligence, that is, the number of things and the sale for them, etc.?—*A.* The Industrial Department must be able to do all that. Otherwise how are they going to guide?

Q. Don't you think that two different kinds of men are wanted?—*A.* I think the industrial man must have some amount of commercial knowledge.

Q. You are personally interested in the tanning trade?—*A.* Yes.

Q. Do you send out your skins completely tanned or partially tanned so that they could be used for manufacture?—*A.* Sometimes the trade could use it directly for various purposes. Sometimes they could not do it. They have got to be processed in Europe and America and other places. The man that colours them and makes them into fancy leathers and that sort of thing is a different man. We have not got any work of that kind.

Q. In the case of hides you have them partially tanned and the tanning is completed in England?—*A.* Yes.

Q. Have you any idea that it would be possible to carry the tanning to a much further stage of development here?—*A.* I should think it would be possible to do it provided we have got some technical expert who would show the way to do it.

Q. You had a technical expert here for a time, Mr. Guthrie?—*A.* We had. But one man would not be enough. The man must be able to teach. I do not know what Mr. Guthrie was able to do.

Q. How long was he here?—*A.* Two or three years.

Q. Did you see much of his work?—*A.* I saw him very often. I have known him. He was going about the country and making a survey.

Q. Getting information?—*A.* Yes. But the European experts have no knowledge of the local conditions and they will have to make mistakes and then find them out.

Q. Do you mean to say that he should have done some experimental work before he can teach?—*A.* That would be much better. The Indian tanner is a clever fellow in his own way and he is ready to take to anything that would pay. The thing is that he is not willing to risk and most of the work that they do is routine work. They are afraid to venture out because of the fear of loss.

Q. You want the Government to take preliminary risks of experimenting?—*A.* That will have to be done because we have not got the experts.

Q. Have the local tanners the money to take up tanning on a modern scale if the preliminary difficulties are worked out and settled?—*A.* I think there is plenty of money. I do not see that there is any difficulty with regard to money. The people who buy their goods will finance them always. They themselves have also invested. The other day I was collecting statistics of the number of tanners and tanneries in the Madras Presidency. I found that a crore of rupees is invested in the concerns. I think the business will come to three crores.

Q. If you did complete tanning you would have to hold the things for a longer period and you would require more capital?—*A.* I think that would pay.

Q. Could you sell all these completely tanned hides in India or would you have to export them after you completed the tanning?—*A.* I think we ought to be able to sell a good deal in India. I see that the boot and shoe industry will take up a good deal of it. With no machines and labour saving appliances it takes a long time to work at a profit. They are mostly small concerns now.

Q. Would you be able to export at a profit?—*A.* I should think so. We have got the bark and the material and everything. It would save the cost of freight.

Q. If you have to export you come then into competition with a very large number of tanneries which are working on modern methods and in order to be able to compete with them you must have similarly large and elaborate tanneries in this country?—*A.* I am not sure if it is necessary to extend to such an extent as you describe. The men that are working at present have got fairly big tanneries.

Sir F. H. Stewart.—*Q.* You have a great deal of money invested in these tanneries and they are prosperous. There are a very large number of tanneries. Why do you want pioneer tanning?—*A.* There are so many new things in tanning that require to be done.

Q. Chrome leather is already being made here and the very best leather is turned out?—*A.* It is being made here of course. It is fairly satisfactory. But it does not equal the English or the Australian leather. We have got to see how to do it in this country. The other day we had a sample sent. A man brought it from Australia. He was showing us where the defect was. There are so many little things that if there were an expert here he would be able to demonstrate and instruct. It is very difficult to get access to factories to see how they do it. I remember that in one factory they would not allow me to go inside and when I told them that the world is wide enough for both and after some little talk they showed me the factory.

Q. You say that in the absence of protective duties on certain foreign imports grants-in-aid, etc., will be necessary. What particular imports have you in mind?—*A.* There are so many things that are coming from foreign countries which could be made here. I merely made that as a general statement.

Q. That is a purely general remark?—*A.* Yes. Looking into the various things that are sent to this country I found that a good deal of them can be manufactured in this country.

Q. You seem to have travelled a lot and you refer to the necessity of sending out men as commercial attachés and you say that they should be Indians?—*A.* I think that is necessary.

Q. Do you think that you could get capable Indians who could take up the posts?—*A.* I think there are. I do not suppose there will be any difficulty on that account.

Q. You are both a tanner and an exporter. What would be the effect of an export duty on hides and skins? Do you think that it would injure you more as an exporter or help you more as a tanner?—*A.* That is a big question. Personally I think that it would do good. Because there will be so many things that will be manufactured here. What we lose in one way we may be able to make up in other ways.

Hon'ble Pandit M. M. Malaviya.—*Q.* Have you had any dealings with the Bank of Madras?—*A.* We have had no dealings with the Bank of Madras. We have had dealings only with the exchange banks.

Q. You have found no difficulty with regard to finance?—*A.* We have never found any difficulty.

Q. You say that there are about 400 tanneries in this presidency. Is all the leather they prepare exported?—*A.* Most of it.

[illegible] will be perfectly willing to come in.

[illegible] commercial museums in every district?—A. In every important [illegible]

[illegible] think that if it published information about business matters a great [illegible] given to trade?—A. I think so.

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WITNESS No. 213.

[illegible] DIWAN BAHADUR L. D. SWAMIKANNU PILLAI AVARGAL, *Registrar of Co-operative Societies, Madras.*

WRITTEN EVIDENCE.

I may deal briefly with the question of the extent to which industries have been [illegible] or assisted by the formation of co-operative societies, the exact means adopted, [illegible] results obtained. In the by-laws of all co-operative credit societies there is [illegible] enabling members who belong to the artisan and industrial classes to obtain [illegible] for the purchase of raw materials required for industries. The amount of money [illegible] for these purposes is, however, very small, being under Rs. 24,000 in non-[illegible]cultural and under Rs. 47,000 in agricultural societies for the year 1915-16. It is [illegible] not far from the truth to say that the enormous expansion of the co-operative [illegible] movement in this presidency has done comparatively little for the promotion of [illegible]. There is every year a certain increase in the amount advanced for industrial [illegible] but it will probably be a long time before there is any considerable change in [illegible] proportion of the working capital which is devoted to the assistance of industries.

[illegible] three societies which have been registered for the express purpose of carry-[illegible] certain industries, namely, the Conjeeveram Weaver's Union, Mambalam Building [illegible] and the Sulurpet Oil Mongers' Society. The transactions of none of these [illegible] are on a large scale.

[illegible] in fact not possible to expect that for some time to come co-operative societies [illegible] up industries on a large scale. They have as yet gained little experience in [illegible] of such special societies, or in the building up of share capital which is [illegible]. The principal difficulty that has to be contended with is want of share [illegible]. In the first place the members of an industrial society should contribute as [illegible] a substantial proportion of the loans that they might be likely to require [illegible] second place there should be a definite understanding as to the principle on [illegible] societies should be financed by central co-operative banks. Supposing one [illegible] members of an industrial society are willing to pay Rs. 10 each as share [illegible] there is no central bank that will give them a loan much exceeding the total [illegible] of share capital, namely Rs. 1,000. This is the main difficulty at present [illegible] societies, and it is necessary that central banks should be induced to [illegible] liberally with applications for loans from such societies.

[illegible] question 12 the weaving industry appears to be the one most capable of [illegible] development, but there are many other industries which may be developed [illegible]. Oil-pressing on the East Coast and fish-curing on the West have co-[illegible] specially devoted to them. Other industries may be mentioned as [illegible] benefit by co-operative treatment, but the part which co-operative [illegible] to play in industrial development will be subordinate and auxiliary [illegible] of large industries. The object of industrial co-operative societies [illegible] the poorer and middle classes with the advantages of industrial [illegible] to introduce industrial combination itself on a large scale for the [illegible] country as a whole. The special skill for management, the special [illegible] the large capital, that will be required for large industries [illegible] Government departments and joint stock companies [illegible] large industries as an example before them, small [illegible] through co-operative societies and these may gradually [illegible]

Q. Getting information?—*A.* Yes. But the European experts have no knowledge of the local conditions and they will have to make mistakes and then find them out.

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Q. Do you think that you could get capable Indians who could take up the posts?—*A.* I think there are. I do not suppose there will be any difficulty on that account.

Q. You are both a tanner and an exporter. What would be the effect of an export duty on hides and skins? Do you think that it would injure you more as an exporter or help you more as a tanner?—*A.* That is a big question. Personally I think that it would do good. Because there will be so many things that will be manufactured here. What we lose in one way we may be able to make up in other ways.

Hon'ble Pandit M. M. Malaviya.—*Q.* Have you had any dealings with the Bank of Madras?—*A.* We have had no dealings with the Bank of Madras. We have had dealings only with the exchange banks.

Q. You have found no difficulty with regard to finance?—*A.* We have never found any difficulty.

Q. You say that there are about 400 tanneries in this presidency. Is all the leather they prepare exported?—*A.* Most of it.

Q. If there were a bureau of information about industrial matters do you think that will help the people in industrial efforts?—*A.* It might to some extent. But the non-English knowing man has got to be educated and demonstrated to. If he understands the thing then he will be perfectly willing to come in.

Q. You recommend commercial museums in every district?—*A.* In every important place.

Q. Do you think that if it published information about business matters a great impetus will be given to trade?—*A.* I think so.

Q. You recommend that qualified Indians should be taken as assistants in the provincial research institutes and trained there?—*A.* I would make a man trained in Europe to work in the local research institutes. He would have to adapt the knowledge that he has acquired in the foreign countries to the altered conditions of India.

WITNESS NO. 213.

M.R.Ry. DIWAN BAHADUR L. D. SWAMIKANNU PILLAI AVARGAL, *Registrar of Co-operative Societies, Madras.*

WRITTEN EVIDENCE.

Co-operative societies.

I may deal briefly with the question of the extent to which industries have been developed or assisted by the formation of co-operative societies, the exact means adopted, and the results obtained. In the by-laws of all co-operative credit societies there is a rule enabling members who belong to the artisan and industrial classes to obtain loans for the purchase of raw materials required for industries. The amount of money advanced for these purposes is, however, very small, being under Rs. 24,000 in non-agricultural and under Rs. 47,000 in agricultural societies for the year 1915-16. It is probably not far from the truth to say that the enormous expansion of the co-operative credit movement in this presidency has done comparatively little for the promotion of industries. There is every year a certain increase in the amount advanced for industrial purposes but it will probably be a long time before there is any considerable change in the proportion of the working capital which is devoted to the assistance of industries.

There are three societies which have been registered for the express purpose of carrying on certain industries, namely, the Conjeeveram Weaver's Union, Mambalam Building Society and the Sulurpet Oil Mongers' Society. The transactions of none of these societies are on a large scale.

It is in fact not possible to expect that for some time to come co-operative societies will take up industries on a large scale. They have as yet gained little experience in the organisation of such special societies, or in the building up of share capital which is most essential. The principal difficulty that has to be contended with is want of share capital. In the first place the members of an industrial society should contribute as share capital a substantial proportion of the loans that they might be likely to require and in the second place there should be a definite understanding as to the principle on which such societies should be financed by central co-operative banks. Supposing one hundred members of an industrial society are willing to pay Rs. 10 each as share capital, there is no central bank that will give them a loan much exceeding the total amount of share capital, namely Rs. 1,000. This is the main difficulty at present with industrial societies, and it is necessary that central banks should be induced to deal more liberally with applications for loans from such societies.

As regards question 12 the weaving industry appears to be the one most capable of co-operative development, but there are many other industries which may be developed co-operatively. Oil-pressing on the East Coast and fish-curing on the West have co-operative societies specially devoted to them. Other industries may be mentioned as being likely to benefit by co-operative treatment, but the part which co-operative societies are likely to play in industrial development will be subordinate and auxiliary to the introduction of large industries. The object of industrial co-operative societies must be to familiarise the poorer and middle classes with the advantages of industrial combination and not to introduce industrial combination itself on a large scale for the development of the country as a whole. The special skill for management, the special scientific knowledge, the large capital, that will be required for large industries cannot be made available except by Government departments and joint stock companies working in co-operation. With large industries as an example before them, small industries will naturally come into being through co-operative societies and these may gradually be enlarged.

ORAL EVIDENCE, 24TH JANUARY 1917.

Mr. C. E. Low.—*Q.* Can you tell me whether these industrial co-operative societies are for purchase or distribution or production?—*A.* They are principally for production, but they also purchase their raw material; in fact, they take up co-operative production work.

Q. In what way?—*A.* The society in Conjeeveram produces cloth; that at [illegible]lam produces oil.

Q. Does one member do the sizing, another the warping and another the weaving?—*A.* The union in Conjeeveram is on the factory principle; all the members come together and work.

Q. Will you explain how it works, and what degree of success has attended it?—*A.* It has been working for a number of years, 7 or 8 years, but I cannot say that it has been very successful, because Conjeeveram is a very large weaving centre and we have not been able to get into the society any considerable portion of the weaving community. We have about 70 or 80 members there. The Secretary is a most pains-taking man. He is a Brahman and not a weaver, but has given himself up to this work.

Q. Do they use power plant?—*A.* Not power.

Q. They are not making such large profits than other people are attracted to join?—*A.* No.

Q. How do the oil workers do?—*A.* The one that is at Madras, which is an old society, has ceased to work through difficulties of various kinds, but the one in Nellore, which is also an oil-producing society, gets on fairly well. Of course there are nothing like large profits made as yet, because it is a young society, being about two years old.

Q. How does the oil-mongers' society work? Do they purchase their oil-seeds together? Have they got an engine and press?—*A.* They have mills, country mills; but nothing like engines or superior mills. They work together on co-operative principles.

Q. And sell their oil and cake on joint account?—*A.* Either on joint account or by the members individually. It depends on their choice.

Q. I suppose there are a number of industrial societies which purchase their material jointly?—*A.* I don't think that there are many other societies called industrial, but a good deal of money from the ordinary credit societies is advanced for the promotion of industries. We have no other societies which purchase material, because in this presidency we have sharp distinctions between societies doing credit work and others doing industrial work, and if any other societies did industrial work proper, I should know about it.

Q. I mean you get a credit society which purchases raw materials like yarn, on behalf of its members, and divides it out among them, and then they work on individual lines?—*A.* We do not ordinarily allow credit societies to do all that. We have a policy which confines societies to one particular kind of operation. If it is registered as a credit society, it is not allowed to purchase raw materials, except as an arrangement among its members. It cannot bring the sale-proceeds on its books.

Q. Would it be allowed to do it by hand-to-mouth loans?—*A.* There is a combine among members called joint loans. There may be 10 or 12 members who want to do a particular kind of work, and take a joint loan from the society and do the business themselves.

Q. Is that done to a large extent for industrial purposes?—*A.* I don't know whether it is done for industrial purposes. It was done in a few cases. I have no exact and accurate record. I am only concerned with joint loans, but I know that joint loans are taken largely for the purpose of supplying members with agricultural requisites.

Q. Is the kind of thing I was describing—purchase by the society of yarn for its members, if the society was registered for that purpose—discouraged?—*A.* Not at all. We are most anxious to encourage such societies.

Q. But there is not much popular demand for it?—*A.* No.

Q. Why? Because they get their yarn fairly cheap otherwise?—*A.* What happens is that the sale of yarn is in the hands of the bigger weavers in every place. That has been our great difficulty. It is easy enough to get the ordinary ryot out of the sowcar's hands, but where there is a big weaver belonging to the caste, who manages the whole of the sale of yarn, it is very difficult to get the small weaver out of his hands.

Q. Do you think such a position, which is common all over India, viz., these weavers indebted to large Chetties; they buy their yarn from him, sell their cloth to him and borrow from him to live on—do you think that is a desirable state of things from the weaver's point of view?—*A.* Not at all.

Q. Do you think it interferes considerably with the hand-weaving trade?—*A.* Very much. Unfortunately we are not able to bring it home to them.

Q. Is there what I call a free market for the cloth these weavers produce; can the man sell it for a fair price as soon as he has made it, or has he to wait for time and season, and go and look for customers?—*A.* Their production is limited by the prospects of sale; if they are poor people, they cannot find a demand.

Q. There is no free market then?—*A.* Not generally.

Q. The evidence from certain other places rather gave me the idea that when there was a free market, the co-operative industrial societies succeeded?—*A.* I think that is exactly the case. I saw a very good example of it in Pudukkottai State [illegible] poly. They have a co-operative society which manufactures silk cloths and the [illegible] are getting on very well because they have a certain market. They are able to sell their produce at once in the neighbouring villages.

Q. We found that the ordinary country potters' society was succeeding?—*A.* I should think that that was the case. If we have a certain market, we should certainly be able to plant more co-operative weaving societies.

Q. Do you think that there is scope for societies of the credit type to help small industries in towns?—*A.* I think our existing town banks do help the weavers to a large extent. We have from 20 to 100 weavers belonging to each one of our town banks who are helped by them.

Q. And they got loans on the Schultze-Delitsch principle producing one or more securities?—*A.* Yes.

Q. And you think that by improving the financial position of the weaver it would put him in a position to cut loose from the Chetties?—*A.* It does. He borrows only for the purpose of getting away from his own sowcar. We are trying to extend that system.

Q. You have got some fishery co-operative societies which, I understand, have been successful?—*A.* They are successful. They raise much of their share capital themselves. Without that, it would be difficult for them to get on.

Q. Whom are they organised by? The fishery experts?—*A.* Between us and the Fishery Department. Nowadays we prefer to follow their lead. They tell us where to work.

Q. When you are dealing with industrial experts generally, do you let them do the propaganda and bring up societies for you to register?—*A.* I would ask them to advise me by going to a place and seeing what kind of work could be done there. When they have told me that, I send my own organisers to organise the society.

Q. You would be in a position to refuse to register a society which was proposed by an expert if you thought it was on bad lines from the co-operative point of view?—*A.* We very seldom do that.

Q. There is no risk of your being rushed into registering a society by some industrial expert who knew nothing about co-operation?—*A.* Not at all. The law gives me sufficient power to deal with applications.

Q. Are any other experts tempted to take their share in the organisation of co-operative societies?—*A.* I don't think they have organised societies. They have helped me with advice occasionally.

Q. They have not been able to produce any process which, to be carried out properly requires a co-operative society?—*A.* I think the Agricultural Department has done that.

Hon'ble Pandit M. M. Malaviya.—*Q.* You say that the amount of money advanced for the purchase of raw materials was under Rs. 24,000 in non-agricultural and under Rs. 47,000 in agricultural societies for the year 1915-16. Is that the largest figure that has been reached in this presidency as yet?—*A.* I don't think the figures in previous years very much exceeded these figures. I must say also that there is some uncertainty about these returns. The purposes for which loans are advanced are classified mostly by the societies themselves. The auditor has opportunity of looking into the matter, but he very seldom corrects things like that.

Q. For how many years has this department been at work now?—*A.* From the introduction of the Act, 1904.

Q. Does not your progress compare rather unfavourably with the progress of societies in some of the other provinces?—*A.* I don't know what is meant by "progress". Numerically we are not very far behind other provinces. We have reached 2,000 societies now, the largest figure in India is 3,600.

Q. And the amount of capital employed by them?—*A.* We have a very large capital. What I quoted above in my written evidence is only the amount lent for the purchase of raw materials for industries. Our working capital for all the societies is nearly 80 lakhs at present.

Q. Is that largely lent for agricultural purposes?—*A.* Yes, very largely; also for purposes of dwellers in towns, but mostly for agricultural purposes.

Q. And the total number of your societies is over 2,000?—*A.* Just 2,000, and of those, 1,800 or even more would be agricultural societies.

Q. For what purposes generally speaking are these loans taken by agriculturists?—*A.* They are taken for the improvement of land, digging of wells, purchase of cattle, purchase of seed and manure, purchase of food and domestic expenses, including those of education, marriage and other ceremonies, etc.

Q. Do they require these loans also to retain their produce for better prices?—*A.* Sometimes no doubt when they take loans for payment of sirkar kist it means that they want to save their produce until they can sell it to advantage. That is becoming very general wherever there are co-operative societies. Where there are co-operative societies, there is practically no coercive process by Government for recovery of revenue.

Q. And not much of borrowing from village sowcars?—*A.* No, they prefer to go to the societies.

Q. What is the interest which you generally charge?—*A.* 9⅜ per cent, i.e., 1½ pie [illegible] per mensem.

Q. What interest do you pay on deposits?—*A.* In town 6 per cent, in villages they [illegible] up to 7 per cent. Members' deposits are encouraged more than non-members.

Bahadur
Swamikannu
lai.

Q. Is it not even 9 per cent a little too high for these agriculturists?—*A*. Nine per cent is about the lowest rate prevailing in the market. The general rate is 12 per cent.

Q. Considering that you get money at 6 per cent or 7 per cent, is it not possible to lend it out on easier terms?—*A*. We have to build up a reserve, and there are the expenses of the society. Our margin in this province is less than in any other province.

Q. Are new improvements in scientific agriculture being introduced to any extent in this presidency?—*A*. Yes, demonstrative experiments are freely exhibited among the people. There are special agencies employed by the Agricultural Department for propagating information regarding new improvements.

Q. Are there any agricultural exhibitions?—*A*. Last year we had one in Madras, and we have local exhibitions occasionally. There are certain districts where there are standing exhibitions held every year.

Q. What is the state of education among these agriculturists in your district?—*A*. My experience has been that, with very few exceptions, in almost all agricultural societies I am able to get at least one or two persons who are able to read and write and keep accounts. The number of societies where we cannot get people locally to keep accounts is very small. I cannot say, however, that education is common among members.

Q. And their standard of education is rather poor?—*A*. Yes.

Q. Do you notice any tendency among these members of co-operative societies to organise schools for the education of their children?—*A*. Wherever they are well informed in co-operative principles, their first care is to organise village schools.

Q. Have you had many instances like this?—*A*. Quite. I have on hand several applications from societies for help in managing schools and getting teachers; applications to be forwarded by me to the authorities.

Q. What would be the total number for last year?—*A*. I don't say there is a general desire, but it is growing.

Q. They are not yet limiting membership to men who are educated?—*A*. It is not possible. In fact, I have supplied thumb impression appliances to every society, because in every agricultural society the majority of members are illiterate.

Q. What is the system for promoting knowledge of co-operative principles; have you got inspectors going round?—*A*. Every grade of officer has to do it in turn, from the Registrar downwards. It is included in his work, and he has to report upon it.

Q. Do you publish leaflets and pamphlets?—*A*. Yes, besides, we have a standing bulletin of co-operation, edited by one of our societies.

Q. Does it confine itself to giving information about the working of the societies in the presidency, or in other provinces too?—*A*. It is quite encyclopædic in that sense and includes information about co-operation everywhere in the world.

Q. Are there many societies organised for the purpose of co-operative purchase of articles of domestic use?—*A*. Yes, distributive societies. We have just now about 20 perhaps.

Q. Are there any special efforts made to draw the attention of the members of the society to the advantages which they would derive by working on these lines?—*A*. Yes, we tell them whenever we can by leaflets and personal instruction of the saving to be effected by distributive societies, and all that.

Q. Have they also begun to organise for co-operation for the purpose of selling their products?—*A*. To a very small extent. A beginning has been made by the Agricultural Department with regard to cotton. We are trying to increase the number of societies slowly but steadily.

Q. About the disposal of their manufactures, are any efforts being made?—*A*. By industrial societies where they exist. They have to find means to sell their products in common.

Q. Are they starting agencies under the co-operative societies?—*A*. They are not sufficiently extensive to do that at present, but no doubt they will do it in course of time.

Q. You don't seem to be satisfied with the amount of progress that is being made in spreading the knowledge of co-operative principles among the people?—*A*. One in my position is seldom satisfied.

Q. You think there is immense room for extending the activities of the co-operative societies?—*A*. I think so.

Q. And you think that much more can be done for lifting up the people through co-operative principles than otherwise?—*A*. Yes, that is my conviction.

Q. You suggest here that it will probably be a long time before there is any considerable change in the proportion the working capital which is devoted to the assistance of industries. Why do you think it will be a long time; are there any special obstacles?—*A*. I think that in this presidency we began with turning the attention of the financing banks to agricultural societies, and we got them to advance money on the particular understanding that so much security would be forthcoming in each society. That was the case for a long while, for 7 or 8 years, before we thought of any other kind of society. That is a very profitable kind of business for central banks; consequently, when we began to put before them industrial projects like weaving societies, where practically [illegible] were no immovable assets, and they were called upon to advance money perhaps, five to ten times the share capital, the central banks declined to take up such business. They said, "We are accustomed to lend money upon assets equivalent to seven to ten times the money advanced by us." If an agricultural society can produce a schedule of property worth Rs. 20,000, the Central bank would lend to it not more than two to three thousand rupees. In the case of industrial societies, supposing with much difficulty it got together a share capital of two or three thousand rupees, that would mean 200 members subscribing Rs. 10 each, and they would want seven or eight thousand rupees more to start their business. No central bank would lend money for that. At the most they would lend money to the extent of the paid-up share capital of the society. That has been our difficulty.

Q. Is it your opinion that in order to finance these enterprises, a new kind of bank should be started with more capital, that it can lend on, so to say, not merely the credit of the share capital subscribed, but on the joint and collective responsibility of the shareholders?—*A*. I think at any rate the old central banks should begin to advance money on new principles, on the security of buildings, machinery, looms, etc.

Q. In the case particularly of these weavers, the cottage industries, the weaving industries, would you recommend that more liberal systems of financial help should be organised?—*A*. I have preached this principle systematically, but without success.

Q. At present you feel that situated as you are, you are not free to advance money on a more liberal scale?—*A*. I cannot get the central banks to advance money on a more liberal scale.

Q. But if banks were started with the definite object of affording more liberal help, these cottage industries would be largely benefited?—*A*. Take the central banks, I think they could do that better, and if they took up a small proportion of business on less security, they would not be endangering their own business; they would be much better off than a new bank that did business exclusively with societies of this kind.

Q. What is it that stands in the way of these existing banks?—*A*. They have to be educated as well as other societies. They say now that there is a certain amount of risk, and their shareholders do not want to face the risk.

Q. Do you think the Government could do anything to encourage them in that direction?—*A*. I do not know. I would rather leave it to the banks themselves. Government might do something indirectly by recognising the necessity for encouraging industries, but directly, unless by advancing money at a low rate of interest, I don't see what they could do.

Q. Do you think if Government advanced money on a low interest to these banks that would help in the direction you suggest?—*A*. It might, but I don't see why the banks themselves should not take up that business, if it is worth their while to do so.

Q. I want to know how they are to be persuaded. I agree with you in what is desirable, but how is it to be brought about?—*A*. It is a question of time and persuasion.

Q. Is it an understanding of that kind that you refer to when you say that "there should be a definite understanding as to the principle on which such societies should be financed by central co-operative banks"?—*A*. Yes.

Q. So far as your knowledge goes, is the weaving industry flourishing, or is it in any way suffering from the competition of mill-made goods?—*A*. I should think it is suffering in most places.

Q. Do you think it shows signs of being able to maintain itself against this competition?—*A*. I don't think it is maintaining itself against the competition. It is dragging on. I don't see signs of its being able to overcome the competition.

Q. Is there anything that you can suggest in order to strengthen it to withstand that competition better?—*A*. I can only suggest the multiplication of societies for this purpose. I have no doubt that in this kind of industry, more co-operative societies would do a great deal of good. I am doubtful of co-operative societies for new industries, but for weaving I have no doubt they would do a great deal of good.

Q. You think that if there were more co-operative societies to help these weavers, this industry would have a good future?—*A*. I am doing my utmost to get more societies into existence.

Q. Is the product of these cottage industries mostly absorbed within the presidency, or exported outside to a large extent?—*A*. From some societies I know it is being exported to Singapore and the Malay States and Burma. There are some societies that buy cloth for that particular purpose.

Q. The great bulk is absorbed within the presidency?—*A*. Yes.

Q. To what do you ascribe it to the fineness of manufacture?—*A*. It is the coarseness generally.

Q. Does it combine with it more durability?—*A*. It is cheap in a way, and also durable.

Q. But is there not a widespread feeling in favour of the indigenous manufactured cloth in this presidency?—*A*. I don't think that there is any class of people who specially patronises one kind of cloth.

Q. One witness told us that among the ladies there is a very strong feeling in favour of indigenous cloth?—*A.* The cloth worn by the superior classes is not imported at all; the yarn is imported.

Q. You say that "the object of industrial co-operative societies must be to familiarise the poorer and middle classes with the advantages of industrial combination, and not to introduce industrial combination itself on a large scale for the development of the country as a whole?—*A.* I meant that it is not possible for us to work the two together, viz., the introduction of a new industry and the organisation of societies for the purpose of carrying on that industry. One of these must go first and I prefer that the introduction of industries should be done by another department; then I would step in and tell the people that it is an advantage to them to take up this new industry and apply co-operative principles to it.

Q. Which department should precede?—*A.* We have the Industry Department, who are engaged in propagating new ideas.

Q. Are you not, as Registrar of Co-operative Societies, more in touch with the industrial people who deal in cottage industries?—*A.* With the people themselves, yes, but for any new industry there is a great deal more required in order to make an effective business combination. We want the principles of scientific processes and the new improvements to be taught to the people. I have not the material for that.

Q. You refer to the technical side; that should be given by the Industrial Department, and the co-operative portion of it would be worked up by your society?—*A.* Yes. There should also be something to encourage people in regard to industries. If you don't persuade the people that there is some money to be made by this new industry, all my efforts would be thrown away.

Q. What would you suggest in the way of what you think ought to be done with reference to your last statement?—*A.* I think model industries would be very good. I was in fact thinking of organizing a society to do fish-canning because a Government department has been doing that for some time. They are doing soaps now. Possibly by and by I shall have soap societies.

Q. Are any lessons relating to co-operation put in the vernacular text-books which are in use in our schools here?—*A.* There may be, but I am not aware of anything being done, but the idea has often been presented to the Education Department. I think in one or two books on civics they have one or two chapters on co-operation.

Q. Do you think it would be desirable to introduce such lessons in the primary schools?—*A.* The question has been much debated, and I prefer not to express any definite opinion until the people or some committee or some school book society expressed a desire to include such lessons. We have admirable material at our disposal.

Q. Would that not be the best way of having co-operative principles inculcated, to introduce it into vernacular text-books in primary schools?—*A.* From one point it may be, but from another it is said that co-operation is a business relating to money, and it is too early to introduce it into elementary schools. You may introduce moral ideas, but no more.

Q. But the moral idea is inseparable from the co-operative movement?—*A.* In practical propaganda we are rather insisting upon the doing of business on co-operative lines.

Q. But you need character at the botton of all business?—*A.* We do insist upon it, but unless we taught methods of business, we should be teaching co-operative principles only by insisting on the moral side.

Q. Would you not leave the business side to a later stage of a boy's education if in the beginning you inculcated the principles of it?—*A.* It is quite possible to do it.

Q. Do you think it would be advantageous; it would help you to spread ideas of co-operation among the people generally; won't it?—*A.* I would advocate perhaps the introduction of lessons on co-operation into schools at a later stage.

Sir F. H. Stewart.—*Q.* You refer to the "enormous expansion of the co-operative credit movement in this presidency which has done comparatively little for the promotion of industries." In the same paragraph you comment on the small amount of advances?—*A.* For industrial purposes only.

Q. And for agricultural purposes too it is quite small comparatively?—*A.* Only the amount advanced for the purchase of raw materials.

Q. To what do you ascribe that; is that due to want of knowledge of the facilities that can be obtained?—*A.* I should think so.

Q. What steps do you think should be taken in this matter? I understood from your answer to Mr. Low that you did attract an active market?—*A.* Oh, yes; we stimulate the people, speak to them of the advantages, etc.

Q. You work closely in touch with the Director of Industries?—*A.* Not very closely at present because of the small number of industrial societies. Whenever I have a chance I consult the Director.

Q. Who would come first; would you form your society first and then go to him and say "Please help this industry if you can," or would he come to you?—*A.* [illegible] both ways. The other day some people came to me from Nellore [illegible] facturing society. I told them "Draw up your by-laws and I will [illegible]

Industries to advise me and you." Or he may ask me to study a particular field of work, and introduce a co-operative society there.

Q. You refer in your second paragraph to three societies which have been registered, and you refer later on to co-operative societies for fish-curing on the West Coast. Are there many of those?—*A.* We have among the fishermen on the West Coast about half a dozen societies, and the movement is spreading. They have been registered because the Fisheries Department is working actively among them.

Q. Do they concern themselves with marketing at all?—*A.* Just now we have formed them on the credit principle, but we are trying to introduce industrial co-operation among them. I have just visited Tellicherry for the purpose of organising a fish curing society.

Q. Are your co-operative societies ousting the sowcar to any marked extent?—*A.* Yes, whenever we have a large society in any of the villages, say, about 100 members, the sowcar has no room for his operations.

Q. He has been charging as much as he can get; perhaps, an anna on the rupee per month or more, and you are lending money at 9½ per cent?—*A.* Yes. We don't as in other provinces, insist upon members of our society dealing exclusively with the society; we leave it to the operation of the society itself; as it expands, it draws in the members and keeps them out of the sowcar's hands, and gradually they convert the sowcar's debt into the society's debt and they bring in friends and neighbours into the society.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Have you got any central co-operative bank like that in Bombay?—*A.* We have a central co-operative bank here, and it is going to be made a central bank for the whole of the province.

Q. Are the debentures guaranteed by Government?—*A.* They are not and will not be. There is no idea of guaranteeing them.

Q. Do you think a bank like that in Bombay would be useful here, with a Government guarantee?—*A.* Yes.

Q. How many central banks have you got here?—*A.* I have twelve central banks in the presidency.

Q. What is the capital of the largest bank?—*A.* The share capital of the largest bank is Rs. 2 lakhs.

Q. Do these banks lend money on your recommendation?—*A.* Mostly; under their by-laws, they have to lend such money on the Registrar's recommendation. The law requires that. They use to the fullest extent the knowledge of the Registrar to ascertain the solvency of the society to whom they have to lend the money.

Q. You say generally they keep a very large margin on the security side?—*A.* Yes.

Q. Have you got any unions?—*A.* We have got many unions, 30 already, and expect to bring in a very much larger number before long. The idea is to get every society in the presidency into a union of some kind as in Burma.

Q. Do they pay their arrears well?—*A.* There is the same complaint all over. We have a certain amount of arrears. Our town societies are very much better; they pay arrears much better.

Q. Do these banks give loans for long or short periods?—*A.* They give loans for ten years to agricultural societies; it is more nearly 12 than 10. They don't exact any repayment of instalments for the first two years, and then they are satisfied if one-tenth is paid every year; if not, they may claim payment of the whole.

Q. Do you think that these banks are rather shy of giving money for industrial societies?—*A.* So they are.

Q. Don't you think they have no experience of the thing and wrongly suppose that if they gave money on looms, they will not realise their money?—*A.* It is from want of experience.

Q. Don't you think that if you have industrial banks with a Board of Industries and Director, who recommended certain industries which are actually started under their recommendation, then these banks will be able to lend money better?—*A.* I doubt whether more capital will be forthcoming into such a bank without Government guarantee. If there is Government guarantee, I dare say we shall get money quite easily.

Q. If there is a central industrial bank, with Government guarantee, and if they lent under the recommendation of the Board of Industries, then could the industries thrive?—*A.* I would like to make one observation, that is, that a co-operative industrial society offers a special kind of security, and I should think that the ordinary central bank should be quite prepared to lend on the special security of a co-operative industrial society, though it is not like the security of an agricultural co-operative society; therefore though I have not thought it necessary to suggest a special organisation for that purpose, I still think that it should be possible to find all the money from a big industrial bank.

Q. They are all labouring men; how are they to get recommendations, from what persons?—*A.* Just as they are consulting the Registrar now, they would consult an industrial expert. I do not think the co-operative industrial business by itself would be sufficiently large to engage the capital of large industrial banks, but if you had industrial banks especially for the encouragement of large industries, co-operative industrial societies would take advantage of such a bank.

WITNESS No. 214.

MR. H. T. WALTERS, *Chief Inspector of Factories, Madras Presidency.*

WRITTEN EVIDENCE.

For the development of industries in India there are many complicated problems requiring solution and among them may be mentioned:—

(*a*) aversion of educated men to industrial concerns;

(*b*) want of a co-operative spirit and confidence among Indians generally; the apparent capital which could be launched for the development of industries, is barred in consequence;

(*c*) lack of knowledge and want of initiative together with a strong attachment to traditional modes which oftentimes lead them into a narrow groove; and

(*d*) desire to secure very large profits with little or no care for the proper maintenance of machinery and works.

ical aid.

The establishment of an Imperial Research Institute properly equipped with the best available experts, may be advantageous to the development of industries. The services of such experts may, after Government has satisfied itself as to the success of projects introduced, be lent to any firms or companies requiring advice, and if circumstances demand, financial aid may be given by Government, subject of course, to its control. The industrial side of the research institute should be in a position to give the best practical advice to private enterprises; and its trade experts be able to analyse business problems and at the same time determine their chances of success. Should the industries in India expand to such an extent as to require further stimulus, then, the experts connected with the department suggested, may be sent abroad to study conditions and needs of industries and trades, so that they will be in a position to give advice as to the necessity or otherwise of extending or further developing any industry requiring such aid.

The suggestion given above to establish a research institute should, in no way, bar the Local Governments from maintaining their present staff of experts, so as to enable them to pioneer any industry which would be beneficial to the provinces.

ing of skilled our.

The value of skilled labour is not in any manner appreciated to the extent deserved, with the result that it is scarce; and to induce more highly technical skilled labourers, the curriculum of studies should be revised in such a way that students should be able to spend a part of their course in technical, scientific and industrial studies combined with workshop training.

Technical training and general education should commence at the elementary stage. The courses of education should be so revised as to suit the elementary, high school and college stages. Municipal, Public Works Workshops, Local Fund Workshops and Government-aided technical institutions might be utilised for the purpose of imparting practical knowledge to the students.

For the better training of apprentices employed in mechanical engineering works, etc., night schools should be opened in convenient centres where large industrial concerns are established, for the purpose of teaching technical subjects, instead of leaving such apprentices to gain the shadow for the substance.

Unless the fundamental principles connected with industries are inculcated into the minds of youths at the most impressionable period of their lives and a love for an industrial profession created in them, industries must continue to suffer.

It is, however, somewhat hopeless even to attempt to induce youths to undergo a course of technical training with the view of entering industrial concerns unless abilities are more generally recognised than the case now is, as it is very noticeable how industries are at the present time handicapped, owing to the reluctance of employers to utilise highly skilled labour or to adopt scientific methods. This disability could be removed by direct Government intervention or by non-official advice and support; and the employment of more highly educated and better paid skilled labour would ensure a better outturn and quality of work with increased profits.

Although the law in this province does not require any qualification for an engineer in charge of prime movers owned by private owners, it is necessary that a uniform qualification should be made compulsory throughout India for the purpose of safe, efficient and profitable working.

There appears to be a considerable increase in the last few years in the quantity of groundnuts exported from this country. This requires investigation with a view to developing the industry of extracting and refining the oil. There are already many crude oil presses for extracting oil and fat from various seeds, but the operation, so far as can be judged, requires proper technical advice in regard to machinery and manufacture. For the want of such advice one large mill had to close down.

ORAL EVIDENCE, 24TH JANUARY 1917.

Sir F. H. Stewart.—*Q.* What are the principal difficulties with labour in this part of the country?—*A.* I believe the greatest difficulty [illegible] at times when the agricultural work is busy.

Q. That is a greater difficulty here perhaps than in Bengal even?—*A.* Yes. In the Madras Presidency also that seems to be one difficulty in rice mills and some other factories.

Q. How is labour recruited? Is it recruited by contract or through sirdars?—*A.* Some of it by contract and some permanent, but more on contract than permanent.

Q. Is there direct employment of labour by the employers?—*A.* Yes. Take the rice mills for instance. There is a permanent staff that would consist of the engine driver, firemen, fitters, clerks, watchmen and maistries. All the other people would be contract coolies, that is to say, they would be employed very indiscriminately. There is no permanent employment, one may say, for the regular masses in this presidency. That is, of course, in regard to rice mills. In textile factories it is different. The employment there is permanent and I do not think that in any textile factory there is much difficulty in obtaining labour.

Q. I understood yesterday from one of the largest employers of labour here that perhaps five hundred of his hands go out every month—they are always going out and coming in?—*A.* I think you may safely say that ten per cent of the employes are absent each month. Whether it is due to drink or to other things I could not say, because I do not see them for myself and therefore I am not in a position to give an opinion. But I do know that there is at present ten per cent absent each month.

Q. Is that class improving in your opinion?—*A.* Yes. I think they have made a very rapid stride in the last five or six years.

Q. Is it owing to better conditions of labour or better pay or better treatment generally?—*A.* I think in regard to textile factories it might apply, but not so in the case of others. One of the greatest difficulties in this presidency is the grade system. Under that system when a man gets to the maximum of his grade he cannot get more until some one dies. It is not so in all factories, but to some of the larger ones it does apply.

Q. Can you explain that in a little more detail?—*A.* That is to say, the greater the pay the less number there are in the grade. There are so many grades, first grade, second grade and third grade. A fitter who is in the third grade may be equal to the one in the first grade, and yet he cannot get more pay.

Q. Who grades them?—*A.* They are graded according to the conditions under which they are employed.

Q. And not by the mill or factory?—*A.* The factory has got so many grades. Take the fitters department. There are first class fitters, second class fitters and third class fitters. The pay perhaps to one would be eight annas, the next may get twelve annas and the third may get a little more—a matter of one rupee.

Hon'ble Sir R. N. Mookerjee.—*Q.* That class is on account of the merit of the work. There is no official rule that he should be in the first grade?—*A.* It is left to the option of the man. When persons apply for employment they go into the grade that is open. The first grade is for the best men.

Mr. C. E. Low.—*Q.* Suppose there is a very good man who comes along and says "Unless you put me in the first grade, I would not come"?—*A.* That man takes the third grade when there is no first grade open. You find the same thing applies in Government service.

Q. There are so many entertained in each grade and even if there is a good man coming along and there is no vacancy in the first grade, they do not take him. Who lays down the numbers for each grade?—*A.* I could not say who is responsible for laying down the number that should be put in a certain grade, but in a grade there are so many. The shop number is so many and that is divided into so many grades and so many are allotted to each grade.

Q. I understand that very well applies to fitters, but does it apply to weavers and spinners also?—*A.* The conditions of work and the quality of work would be practically the same all round.

Q. It does not apply to weavers?—*A.* I leave textiles out of the question.

Sir F. H. Stewart.—*Q.* You recommend night schools in convenient centres where large industrial concerns are established for the purpose of teaching technical subjects. Would you give instruction in the vernaculars or in English?—*A.* Instruction can be given both in the vernacular and in English, because in some of the very large factories there is a large number of only Indian employés and there is a fairly large number of Indians that know the English language.

Q. How long have you been the Chief Inspector of Factories?—*A.* Ever since the appointment was created, since 1912. I was Special Inspector of Factories and Senior Inspector, Steam Boilers and Prime Movers for the City of Madras for about 18 years.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* You say, "The industrial side of the research institute should be in a position to give the best practical advice to private enterprises and its trade experts be able to analyse business problems and at the same time determine their chances of success". Don't you think that this is the work of the Director of Industries and the Board of Industries more than that of the research institute, as regards advising people to what industries they should apply themselves?—*A*. I do not think that it is possible for the Director of Industries to take up everything in that connection.

Q. Research work ought to be separate from giving advice to the individual?—*A*. Yes, as regards private advice only.

Hon'ble Sir R. N. Mookerjee.—*Q.* Your duty is to go and inspect the machinery?—*A*. I inspect the factories from the sanitary standpoint as well as of the safety of the machinery.

Q. You have nothing to do with the business part of the factory?—*A*. No.

Q. On what authority do you say then, that [illegible]ersion of educated men to industrial concerns, the want of a co-operative spirit and [illegible]dence among Indians generally" are some of the complicated problems requiring solution?—*A*. I give you those particulars from the experience that I have gained during the many years I have remained in this presidency.

Q. It is mere hearsay?—*A*. Not altogether hearsay, but from what I have noticed. Having been Inspector of Steam Boilers I was brought in contact with the general conditions.

Q. No business man allows an Inspector of Factories to meddle with the business part of his factory?—*A*. I have come in contact with a large number of managers who have told me their experience.

Q. You remember that in the questions list it is specially stated that you ought to answer only those in which you have had actual experience? You say, "The value of skilled labour is not in any manner appreciated to the extent deserved." What do you mean by that?—*A*. There are no openings for them that one would expect to see when they become competent. I say that competent men are not appreciated and there are not a good number of competent men that should be in the presidency for carrying on works.

Mr. C. E. Low.—*Q.* What is the average rate of wages here in the textile mills?—*A*. In textile factories, anything between eight and twelve annas for weavers and spinners.

Q. How does the cooly labour run?—*A*. It runs to about six annas a day in Madras.

Q. And outside the presidency town?—*A*. It is varied. In the agricultural season men coolies would each get five annas a day and women coolies each about 2½ annas, but in the factories they would get four annas and two annas, respectively.

Q. How much does a fitter get?—*A*. That is a very varying quantity. They get anything from Rs. 30 to 50 a month, and sometimes, of course, less. But there are so many grades of fitters in the presidency.

Q. You are in favour of the system of engineer certificates?—*A*. Yes.

Q. You do not have it in this presidency?—*A*. No.

Q. And you do not have it in Bengal?—*A*. I think not.

Q. But it exists in other provinces?—*A*. Yes, in the Central Provinces, the Punjab, Bombay and the United Provinces.

Q. You think that for the purpose of safe, efficient and profitable working, engineers certificate is required?—*A*. Yes.

Q. Do you think that a non-certificated engineer's work here is less efficient than that of a certificated engineer's?—*A*. I think that if we had certificated engineers, better results would accrue from the employment of better trained men.

Q. There are certificated engineers in the big factories?—*A*. That is in better regulated factories.

Q. The other factories do not employ certificated men? Are any of the non-certificated men of really high qualifications?—*A*. Some of them are really very good practical men.

Q. The majority of them are not?—*A*. No.

Q. But they are equal to third class engineer certificated men in other provinces?—*A*. I dare say that many of them will not be equal to third class certificated engineers. Many of the managers of the factories, such as rice mills, have no industrial training and employ uncertified engineers and are quite satisfied so long as they keep the machinery going irrespective of what it would cost to work the factories to the advantage of the consumer by certified engineers. I think that the system of examination of engineers and granting certificates would be beneficial to the presidency, and it would make far more efficient work and would create openings for better trained men.

Q. It largely turns on the question of third class engineers?—*A*. Yes.

Q. What is your opinion about the education of factory children?—*A*. My views are that it is wrong to make a child of nine years work from 6 a.m. to 12 noon and then give that child three or four hours education after that. I think the strain will be too great upon the children, especially the children that we have here. They are none too strong.

Q. Are you in favour of splitting the shift system or simply of reducing the number of hours?—*A*. The number of hours that they work is quite all right, that is six hours, provided they do not do anything more after that.

Q. Suppose [illegible] was decided to educate factory children, would you reduce the hours to three or would you have a split system of three hours shifts?—*A.* I would keep out children from factories till the age of fourteen.

Q. Are there any children, as a matter of fact, in any of these factories under fourteen attending school?—*A.* A very large number. For those in the Carnatic and Buckingham Mills, the conditions for educating them and employing them are very good, but I do not think it would be possible to get conditions similar to those that are provided in those mills in any other mills in the presidency. The children are working six hours in those mills and the surroundings are so favourable that they are really better than they are at their ow[illegible]es and the strain on the children is less. They are educating them for three h[illegible]nd the rest of the time is devoted to gardening work and play.

WITNESS No. 215.

MR. C. A. INNES, I.C.S., *Director of Industries, Madras.*

WRITTEN EVIDENCE.

I have not had time to deal properly with the questions asked by the Commission nor, since I have only just taken over the department, is my opinion of much value. But I append a few fragmentary notes on some of the questions. It will be understood that the opinions expressed are purely personal and provisional.

Financial aid. In regard to this question the experience of the Travancore Government with the Travancore Paper Mills Company may be of interest to the Commission. This company was floated in 1887 with a capital of Rs. 3 lakhs raised by 600 shares of Rs. 500 each. The Travancore Government took 50 shares in the company and also guaranteed to pay interest at 4 per cent to the shareholders for 15 years. It was stipulated that if the company ceased to work for one year during the period of 15 years, the Government would be at liberty to cancel their guarantee for the rest of the period, but the shareholders refused to ratify this stipulation on the ground that it was not mentioned in the prospectus which had been issued with the approval of Government. One of the Directors was a Government Director, and all statements of interest, etc., were checked by him before being submitted to Government. It was decided to establish the mill at a place called Punalur and to work it by water power. But the estimate of the capital expenditure was too low, and before the mill was ready for work, funds had been exhausted. In July 1889 therefore Government advanced a loan of Rs. 1½ lakhs at 8 per cent on the security of the property. The revised estimate however again proved too low, and by December 1889 out of a total capital of Rs. 4½ lakhs, Rs. 4¼ lakhs had been spent on the mill and the machinery, and Rs. 25,000 on raw material. No money was available for the payment of labour, and a further loan of Rs. 25,000 on the same terms was obtained from Government. The mill did not begin work till the 15th November 1890, and by September 30th 1891 had incurred a loss of Rs. 25,716 or, including interest, Rs. 38,304. The company was again in difficulty for funds, and Government again advanced a loan of Rs. 63,000. In the following year also Government came to the rescue of the company with a large order for paper as well as with another loan of Rs. 20,000. But this amount did not suffice to meet the working expenses of the company, and yet another loan was applied for. By this time however the Government had had enough, the loan was refused, and the company ceased work in March 1893. A compromise was arrived at with the shareholders in regard to the guaranteed interest for the rest of the 15 year period, and eventually Government sued the company for the mortgage amount and interest. They bought in the property at the court sale, and later on sold it for Rs. 32.005. The net loss incurred by the Travancore Government in the venture was Rs. 5,08,672. These particulars were taken from a note published in the *Travancore Gazette*.

The general question of financial aid by Government to industrial enterprises has been considered twice in recent years in Madras. The Industrial Conference refused to commit itself further than to say that money grants or subsidies for the assistance of new industries or industrial schemes might be given in special circumstances. But a Committee appointed in 1909 to consider the chemical industries of the Presidency passed the following resolutions:—

'The Committee are aware that the recognition of the principle of direct or 'indirect subsidies, common in continental countries, is fraught with danger, and may 'fail in its object of forwarding the industrial expansion of India, unless restricted in 'its application according to definite principles and hedged round with certain safe'guards.

"The principles which the Committee would regard as indispensable are—

'(a) that the industry should be a pioneer one backed by sufficient capital, 'possessing adequate plant and under expert technical and scientific control;

'(*b*) that the subsidy should be indirect and preferably bearing some relation
'to outturn;

'(*c*) that the subsidy should be for a limited period only.

And the safeguards they would suggest are—

'(*d*) that subsidies should be given only to companies registered under the
'Indian Companies Act and not to private individuals;

'(*e*) that during the period of the subsidy no portion of the same should be paid
'away in dividends;

'(*f*) that the accounts should be audited by Government agency or by an
'auditor approved by Government.

'Provided that these conditions are fulfilled, the grant of indirect subsidies is,
'in the Committee's opinion, likely to minimise the risk of failure and to demonstrate
'at the same time to the general public that those who incur a large expenditure in
'industrial experiments are deserving of State encouragement and assistance.'

My own personal opinion on the general question of State aid to industries is as follows:—In the first place it must be recognised that Madras is and probably must always be an essentially agricultural country. There is no coal in the Presidency; fuel is dear, and there is no possibility at present of cheap power. This being so, industries are naturally few and far between, and the prospect of converting the Presidency into an industrial country is not hopeful. It follows therefore that agriculture must be the chief care of the Madras Government. It follows also that a policy of dry nursing, whether by financial assistance to private enterprise or by pioneering industries, is never likely to lead to much result in the field of industrial development. The most hopeful method of making any real impression on the situation would probably be to investigate every possibility in the way of cheap power. Every possible hydro-electric scheme should of course be carefully investigated, and possibly something should be done to experiment with the destructive distillation of wood spirit as proposed by Mr. Chatterton. Something has already been done in the way of popularizing oil engines. But liquid fuel is getting dearer and dearer, and the next step should be to demonstrate the advantages of gas suction engines burning waste fuel, such as paddy husks, groundnut shells and the like. At any rate it must always be borne in mind that the Madras Presidency can never become a really industrial country until the problem of cheap power has been solved.

At the same time I do not mean to imply that Government should confine their attention solely to agriculture and to the question of power. On the contrary I believe that their policy should be one of watchfulness and that they should always be ready to give a helping hand to well considered industrial enterprises and should, in certain circumstances, pioneer industries. On general grounds I think that a private firm or company, which is out to make money, provided that it has adequate capital at its command and that it is managed by competent business men, is more likely to make a success of a new industry than a Government department. If then it is admitted that Government may legitimately pioneer industries (and this, as far as I can judge, has always been the position of the Government of Madras), equally it should be admitted that it may legitimately assist private firms and companies in establishing new industries. Preferably Government assistance should take the form of establishing laboratories where analyses of raw materials can be effected, of providing facilities for preliminary research and experiments, of supplying information in a convenient form regarding the raw material available in the Government forests and elsewhere, and of granting concession rates in respect of the fuel and timber required from the forests and so on. Also I am much in favour of Government, where it is possible, guaranteeing purchase subject to obvious stipulations regarding price and quality. But in special cases, when Government are satisfied that the money will not be thrown away, I am in favour of direct financial aid. The exact form of aid must depend on the circumstances of each case. I am not in favour of any system of guaranteeing dividends. Such a system must to some extent be demoralizing. Nor am I much in favour of Government providing any part of the share capital of the company. I do not think that the public should be enticed into a company by being told that Government have invested the tax-payers' money in it. Further the system would probably involve some measure of Government control and Government responsibility, which I think objectionable. Government control should, in my opinion, be limited to insistence on proper auditing, and, in the case of companies, on the publication of properly audited accounts. The hire-purchase system has been considered by Government in respect of oil-engines and pumps and definitely rejected, but I understand that the Government of Mysore have introduced rules under which loans may be granted—

(1) for the purchase and erection of industrial machinery;

(2) for the construction of mills, warehouses and other structures necessary for industrial operations; and

(3) for the provision of raw material, working capital and appliances required for the carrying on of industrial operations.

If experience shows that these rules work well in Mysore, I see no reason why they should not be adopted in Madras. Preferably I consider that the financial assistance should be given for some definite item of expenditure. Perhaps I can best illustrate my meaning by a concrete case. The Madras Glass Company to which reference has been made in paragraph 35 of my preilminary note* made an initial mistake in putting up an intermittent furnace, and there came a stage in its career when it was absolutely necessary for the continued existence of the company that additional capital should be raised and a continuous furnace erected. The shareholders however declined to put up any more money, and the company went into liquidation. This is a case in which Government might, in my opinion, legitimately have intervened. Had Government come to the assistance of the company by advancing or providing the money necessary for the reconstruction of the new furnace, it is quite likely that the shareholders would have been encouraged to subscribe the additional capital required for working expenses In that case the question would have been settled once and for all whether glass can be made profitably in the Presidency, and Government would have been saved the expense of the present experiments. I may say that the suggestion was not made to Government at the time.

Pioneer factories.

On the general question of whether Government should pioneer industries, I think that it must be admitted that the practical difficulties in the way of a Government department managing an industry on real commercial lines are very great, and I think that the policy of the department ought always to be to assist private enterprise rather than to encroach upon the field of private enterprise. My conception of the ideal Director of Industries is that of an officer who enjoys the confidence of the business world and is looked upon by them in the light of a friend at court, and who exists for the purpose of removing, as far as he is able, obstacles in the way of industrial development. But I doubt whether mere assistance to private enterprise will cover the whole field of industrial development for a long time to come. The 'competent business men' in the Presidency are mostly Europeans, and the majority of them seem to find trade and commerce sufficiently profitable to render it unnecessary for them to embark upon the more uncertain field of new industries. Indians are more enterprising and are continually starting new industries in a small way. But most of these ventures seem to fail sooner or later, and as far as I can judge from the information on record in my office, bad management is often the cause of failure. Many applications for assistance to enterprises of this kind would doubtless be received by Government. No doubt they would be considered sympathetically, but in common prudence, I imagine, Government would be constrained to reject most of them. Nor would mere financial assistance be of much avail if bad management is the most frequent cause of the failure of Indian industrial ventures. It is not the Indian's fault of course if he is not as a rule successful in his management of industries. On the contrary it would be amazing if he were. As I have already pointed out, Madras is essentially an agricultural country. There are few openings in the industrial line and few opportunities for Indians to acquire industrial experience. Thus there is not much scope for technical education based on workshop experience, and not much inducement for the better class Indians to enter upon an industrial career. In the circumstances it is not surprising that they are educated either for Government service or for the learned professions.

I am inclined to think therefore that should a suitable opportunity offer itself, Government should not hesitate to start pioneer industries. Public opinion is certainly in favour of this course. It is true that it is difficult for Government to make a commerical success of such ventures. Even Mr. Chatterton's chrome tanning and aluminium experiments were not successful from a purely commercial point of view, but he prepared the way for private enterprise and laid the foundation on which successful private ventures were subsequently built. Every effort however should be made to work such ventures commercially, though obviously they should be on as small a scale as possible and personally I should like to make it a rule that the accounts should be audited every year by chartered accountants. I should also prefer, though I would make no hard and fast rule to this effect, that Government should tackle something big such as the working up of oil seeds in this country into finished products, that they should be prepared to spend money on the experiment and give it as good a chance of success as possible by importing experts from Europe or America to conduct it. When Government should withdraw from the enterprise depends upon the circumstances of the case. In the case of a small enterprise like pencil making, obviously Government should withdraw as soon as the success of the venture is so assured that a private company is prepared to carry it on. But where the field is very large, as in the case of the oil seed referred to above, I do not see why Government should not continue its factory even after private enterprise has entered the field as a training ground for apprentices. Of course in this case it would be necessary to be careful not to undersell the private concerns.

Dem[illegible] factories.

I think also that there is scope for useful demonstration factories. We have been advised that the handloom weaving industry in the Madras Presidency has a future before it provided that it is properly organised, and that the proper form of organization is the establishment of small handloom factories. As mentioned in paragraph 20 of the other note* numerous small factories of this kind have been started in recent years in the Presidency, but most of them have failed, one of the main causes of failure being the dislike of the weavers themselves of discipline and control. The Salem factory was an attempt to solve the problem, and it is unfortunate that Lord Morley's orders left the Government no option but to close it down. But the weaving factory to be installed at the Madura Technical Institute affords another opportunity of dealing with the matter. It remains to be seen of course whether it will be possible to attract children of the weaver caste to the institute. If not however, there ought to be no difficulty in getting children of other castes, and in due course the Institute ought to turn out a class of weavers accustomed to discipline and regular hours, and thus ought to pave the way for the establishment of small private factories. The weaving factory ought to be primarily a demonstration factory, but as far as possible it and all demonstration factories should be run on commercial lines and at it the question of preliminary processes should be studied.

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* Not printed.

Financing agencies.

Q. 9.—The handloom weaving industry by the way is an example of an industry which is hampered by the conditions under which it is financed. Most of the working weavers are paupers. They have no capital and no money to buy materials. Consequently they take advances at high rates of interest, either in the shape of yarn or money, from the cloth merchants or sowcars. Co-operative societies would seem to be the obvious remedy, but so far very little success has been achieved with them, and I believe that only one weavers' society exists in the Presidency. The explanation of this fact, I understand, is the extremely backward condition, both morally and materially, of the weaver community. Indeed there is a remark in one of the reports on record in my Department that the adults are hopeless, and that if we want to do any good, we must begin with the children.

Surveys for industrial purposes

Q. 27.—The Handbook of Commercial Information recently published by the Department of Industries is an attempt to give in as compact a form as possible an account of the chief agricultural and mineral resources of the Presidency. It would be of much assistance to me and probably to business men of this Presidency if similar handbooks were prepared for other provinces. I think also that a similar handbook dealing with useful forest products would be very useful. A good deal of information regarding such products already exists in agricultural ledgers, Bulletins of the Imperial Institute, Forest Memoirs and similar productions. But it is not in a convenient accessible form. I may mention that an assistant to the Commissioner of Forests has just been appointed for the purpose of exploiting the forests of the Presidency.

Sales agencies.

Q. 30.—The Victoria Technical Institute, in Madras is doing useful work both in exhibiting the products of the art industries of South India and in effecting sales. Its sales, I understand, amount to about Rs. 4,000 a year.

A scheme for the development of the art industries of South India has just been considered by a small committee presided over by the Hon'ble Mr. Couchman. The aim of the Committee was to create some machinery for the production and sale of art goods which could be enlarged and extended to the development of all classes of Indian art goods of which there is a prospect of obtaining regular supplies and for which there is a market. They suggest that a beginning should be made with art furniture of which the sales by the institute are larger than the sales of any other class of goods. The Technical Institute has recently opened a workshop for the manufacture of art furniture under the direction of Mr. Hadaway of the School of Arts, and the suggestion is that Government should assist the institute to maintain a much larger number of workmen in their workshop. The question of the sale of the furniture so produced was also considered by the Committee. They suggest that at first the attempt should be made to find a market in Madras itself for the furniture, partly by advertising in the principal hotels, and later on perhaps by arranging with some of the larger firms to sell the furniture on commission. At a later stage again the idea is that a shop might be opened in Bombay or even London, but it is thought that it would be premature to incur expenditure in this direction until it has been shown by actual experiment that arrangements can be made for regular production on an adequate scale. The whole scheme is now under consideration.

Government patronage.

Q. 37.—I think that this suggestion is a very valuable one. The Sea Customs returns are not of much use in this respect for they merely show the quantity and value of the stores imported on behalf of Government under large heads such as glassware, machinery and the like. If abstracts of the actual indents could be published in the Indian Trade Journal it would give Indian manufacturers a chance of tendering.

Land policy.

Q. 41.—The only part of the Presidency which I know really well is Malabar and here "the land policy of Government" (using the expression in the sense in which it is used in the question) undoubtedly checks industrial development in the way of opening up the country for such products as rubber. The trouble is that it is extremely difficult to get a clear title. The ownership of land in remote parts of the district near the ghâts, where rubber can mostly suitably be grown, is nearly always in dispute between half a dozen janmies or landlords, the claims of all of whom are nearly always vague, and acceptance of a lease from one may involve litigation with the other five. The difficulty can be got round by accepting a lease from one of the claimants and hurriedly proceeding to plant up as large an area as possible, in which case the planter cannot be evicted unless the full value of his improvements is paid into court. But this course is not a satisfactory one, and I think that it is worth considering whether in such cases the land could not be taken up under the Land Acquisition Act, the compensation paid into court, and the claimants left to fight out the matter among themselves. Big estates in parts which are nearly always on the margin of ordinary cultivation are greatly in the public interest. They offer good wages and regular employment to the local population, and the two estates in the Mappilla zone have greatly contributed towards the solution of the Mappilla problem. They increase the wealth of the district ; relieve the pressure of the land, and send up agricultural wages within a radius of ten miles.

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* Not printed.

Official organisation.

Q. 57.—I am inclined to think that a purely Advisory Board of Industries would be useful. It should consist mainly of representatives of business firms. As it is the Chamber of Commerce and business men generally are very good about advising the Director. But it would be useful to have a number of business men whom the Director would have the right to consult.

Q. 62.—I do not think that an Imperial Department would. There ought to be in my opinion a much freer interchange of publications such as bulletins and reports between the departments in the different provinces than at present. Possibly as the departments develop, meetings of the different Directors should take place periodically as in the Agricultural Department. The value of such meetings would lie very largely in the opportunity they would afford for informal conversation and interchange of ideas among the Directors.

Provincial departments.

Q. 89.—I have not yet had time to come to any definite conclusion on this subject, but I mention a case which has recently come under my notice and which certainly raises the question whether some such action as is suggested in this question or in question 91 should not be taken. Before the war, Russia used to import beeswax from Germany to the value of more than half a million sterling. After the war she attempted to get Indian beeswax from London, but the stuff was found to be so adulterated as to be useless for Russian purposes (church candles). At the instance of the Director-General of Commercial Intelligence I have been endeavouring to ascertain where the adulteration of Madras beeswax takes place. With the help of the head of one of the firms in Madras, I obtained samples of beeswax from two collecting centres in Madras (Cuddapah and Renigunta) and from Madras. The beeswax on sale in Madras, it may be noted, usually comes from Calcutta. On analysis it was found that the first two samples were quite pure, and that the third was adulterated with 90 per cent of paraffin wax. It would appear therefore that the adulteration of beeswax is a regular business, and that Calcutta is the headquarters of the business. European export firms in Madras won't touch beeswax. It gives them a bad name and this is an example of a valuable trade lost to India through a shortsighted policy of adulteration.

Hydro-electric power surveys.

Q. 102.—The possibilities of a hydro-electric scheme in connection with the Periyar river were investigated in 1904 by Major A. J. deLotbiniere. His report was favourable, and a scheme was submitted to the Government of India. But it was rejected on the ground that in the worst year on record there was not enough water for a power scheme as well as irrigation. I believe that a scheme is under investigation for increasing the supply of water for irrigation, and that if the report on it is favourable, the question of a hydro-electric scheme will again be considered. Gauges have been placed in various rivers of the Presidency with a view to possible power schemes. Every possible scheme should of course be investigated.

NOTE.—*The oral evidence of Mr. Innes is confidential.*

WITNESS No. 216

DR. F. MARSDEN, PH.D., M.SC., *Dyeing Expert to the Government of Madras.*

WRITTEN EVIDENCE.

Technical aid.

I was appointed by the Secretary of State to investigate and suggest to the Madras Government, what steps were necessary to improve the conditions in the dyeing industry in Madras. My instructions were to report upon —

(1) how the industry is carried on at the present time ;
(2) in what respects the practice of native dyers is defective;
(3) as far as possible from a preliminary survey decide how it may be improved.

My report was submitted in August 1911, extracts from this are given in [illegible] accompanying note, and I stated my conclusions as follows:—

"It will be gathered from the foregoing that the development of the dyeing industry in this Presidency is on the whole backward, and that, from the poverty and lack of education of the bulk of the people engaged in it, it is a matter of some difficulty to devise means whereby the conditions of things might be improved.

The people are content to meet immediate requirements only and making but very small demands in the way of profits, are able to dye at a very cheap rate. The quality of the work, however, is not equal to that produced upon similar materials in other countries or in the mills in India, and the dyer here is not in a position generally to compete in any but his own local market.

The methods of business which prevail, especially in the handling and sale of dyewares, do not bring the dyer into touch with the developments of modern tinctorial practice, and his want of education prevents him from realising that products which were good enough in the past are no longer looked upon as suitable for many of the purposes for which they were formerly used and have been displaced by others with which better results can be obtained.

It is hardly possible to expect that under present conditions this state of things will improve, and the direction in which development can best be looked for is in an increase in the number of larger dyehouses controlled by men with capital at their disposal and who possess technical and business knowledge.

Seeing that there are people interested or likely to be interested in dyeing who have capital at command, that business knowledge is rapidly acquired by intimate contact with an industry, but that technical knowledge can best be acquired after a preliminary training in a school or institute in which provision is made for the teaching of the necessary special subjects, I am of the opinion that Government could with advantage make provision to supply this technical instruction as being the most likely means of ensuring that the industry will develop upon lines suitable to Indian conditions."

I was further requested to discuss—

(1) the location of any school recommended;

(2) from what classes of the community I expected to obtain students;

(3) the general educational attainments to be expected of the students and the necessity or otherwise for general chemical work;

(4) the character of the instruction to be given.

Madura being the largest dyeing centre in the Presidency I suggested that the dyeing school and a tinctorial laboratory should be located there, especially as a scheme was in hand for the development of a technical institute in the town.

From a consideration of the general conditions prevailing it seemed to me advisable to restrict instruction in the school to pupils who could ensure their subsequent employment, i.e., to those connected with the textile industries and since improvements in the conditions were only to be expected from a raising of the standard of knowledge of the dye house owners the instruction would require to be of a technological and not of an industrial character. The members of the dyeing community do not as a general rule pass beyond the elementary school but the Sourashtras (the large dyeing community in Madura) maintain a high school and in other centres there are dyers who have realised the value of a better education and it is only a matter of time I think before a suitable class of student is available.

To give instruction of any value in dyeing some knowledge of general science and chemistry is essential, but this is a branch not yet well developed in the schools and before proceeding to any theoretical instruction in the principles of dyeing, most students, if not all, would require to be instructed in general science subjects. Pending the completion of the Madura Technical Institute buildings I rented a small building in Madura and fitted it up as well as possible to serve as my laboratory. In this I held classes for two years to test the capacity of the class of student I had in view. I came to the conclusion that below the matriculation standard there was little hope of a student being sufficiently well grounded to take advantage of technical training, and I have outlined a course, which may be given when the Madura Institute is completed to include general elementary science (especially chemistry) and the technology of textile fibres and dyeing, and hope to amplify this when the institute is developed and is staffed to give instruction in mechanics, electricity, steam and other subjects.

The technical aid which in my opinion will be of most benefit to the dyeing industry is the provision of means whereby the people engaged in the industry can improve their knowledge of the technology of the subject.

In my laboratory, poorly fitted up and inconvenient as it was, I have been able to assist dyers who have visited me or written to me upon [illegible] purification of water, [illegible] of [illegible] the [illegible] cotton, wool and silk [illegible] alizarin dyeing, the use of soda ash in place of fused wood ashes; the dyeing of coir yarn and palmyra fibre; the dyeing of silk with kamela powder stick lac, cochineal, etc., the boiling off and dyeing of floss silk; the dyeing of mineral colours, etc.; and my opinion has been sought upon questions relating to the dyeing of Madras handkerchiefs, the dyeing of khaki, the substitution of natural for synthetic dyestuffs; the valuation of kamela powder, safflower, etc., the dyeing power of various materials and the adulteration of certain products. I have also been called upon to deal with or report upon the supply of and distribution of dyestuffs, the use of a natural indigo paste, khaki dyeing as a jail industry, etc.

My enquiries can hardly be dignified by the title researches as they have been conducted under difficulties as regards laboratory accommodation and have been more directed to the regulation of working processes and such factors as fall to the works chemist in an English dye-works. Except to the individual who was assisted it cannot be said that any benefit to the industry was noticeable. A Government expert, with proper facilities for dealing with this class of work is required, I think, as there are no other channels except the dyestuff agents, through which the dyer can get expert advice. But in this Presidency the loan of Government experts to private concerns is not a question which I think will arise. The mills have their own chemists and staff, and in country dye houses there is neither accommodation nor apparatus for experimental work to be done other than as a practical trial to illustrate some special point, and all the preliminary investigation for this would be done in the expert's own laboratory.

Should it, however arise that any firm be granted the wholetime service of a Government paid expert the question of publication of the results of his work would depend largely upon the nature of the enquiry and the conditions of his deputation. If the enquiry was one dealing with matters of general interest and the firm in question placed their premises and plant at disposal for assisting the enquiry the results should be free for publication. If however the problem to be solved was one incidental to their own special method of working and of paramount interest to them, but for the solution of which they required this special assistance then I can imagine that they would struggle along as best they could rather than run the risk of disclosing matters upon which their competitors would be keen for information.

In such a case if the deputation were sanctioned publication would not be in place. In case of free publication of results no charge need fall upon the firm, but where the right of publication is reserved the firm should be called upon to pay at least the full salary and allowances of the expert.

In my opinion a demonstration factory in dyeing could not be worked satisfactorily except in direct competition with existing businesses. There are two types to be considered, either a fully equipped machine dyeing factory, which would be in competition with the mills and would necessitate an equivalent organisation to ensure success, or a country dye house competing in the markets of the country dyer. This to be effective would have to work at lower rates than the country dyer, otherwise it would not appeal to him as worth imitating but to work at his rates would require his methods of business being followed and this I think could not be done successfully.

I think it preferable in my case to fit up a small building (scheduled for erection with the weaving section of the Madura Technical Institute) with country vats and water connections, and use this for demonstration purposes to dyers when there are points worth demonstrating on a larger scale than is possible in the laboratory.

Note on the dyeing industry in Madras.

Upon taking up my appointment as Dyeing Expert to the Madras Government, my first step was to obtain first hand knowledge of the conditions under which the dyeing industry in this Presidency was carried on, and, after visiting a large number of centres, I submitted my report to Government.

2. The conclusion at which I had arrived was that the mills in which dyeing is carried on require no technical assistance from Government as they are under the control of people who know their business and possess competent technical staffs. The Indian dyer, however, is in a different position; he is, in the main, of little or no education, highly suspicious of strangers, working in a very small way, and dependent upon the merchant who finances him; this remark applies especially to the large number of weavers who dye for themselves the coloured yarn they use in their work.

3. In some places there are dyers of a better class, fairly educated and possessing capital which they employ in their business, but they are few and far between.

4. The general attitude of the ordinary dyer is that he knows all there is to know about his trade and that an outsider can give him no assistance. This attitude has, in the case of those in a large way of business, been modified by their contact with the representatives and agents of the German colour firms, who toured the country and demonstrated the use of the dyes they wished to sell. Confidence being thus established,

the dyer has learned from these travellers how to use the imported materials, but in the majority of cases it is only through the medium of a "recipe" and not with any understanding of the nature of the materials or of the process.

5. When the number of dyestuffs at his command was small and each dyer obtained his shades by methods peculiar to himself, there was room for variation. Now, although the modern dyes which are obtainable in the bazaar appear to be many, their number is but a fraction of those actually made; each one may have its individual characteristics as to shade and fastness but as regards its method of dyeing it belongs to one or other of a few classes the fundamental methods of dyeing which have been investigated, and the makers inform their customers as to the best and most economical process of dyeing each individual. The western dyer knows that he cannot improve upon this method, which is based upon investigation by highly trained specialists, but many, if not most Indian dyers apparently cannot realise that the process given to them is as perfect as it is possible to make it, and proceed to make alterations and "improvements" and evolve what they term a secret process of their own; the only result is to increase the cost of dyeing or to impair the properties of the dye.

6. In my report to Government in 1911 I wrote as follows upon the colour dyeing industry :—

* * * * * *

"5. The dyeing industry is widespread, but is more in evidence of course in the neighbourhood of weaving centres. The dyers do not as a class appear well to do, the general type of dyehouse being small and badly lighted (very often it is part of the dwelling house) and the plant and apparatus employed in the majority of cases is exceedingly simple. In the small dyehouses for cotton, there is usually one round vessel (copper) of about 25 gallons capacity, set over a grate in which leaves, brushwood or wood may be burnt as a source of heat. The hanks of yarn are suspended upon sticks which rest upon the edges of the vessel and from time to time the yarn is turned during dyeing by inserting a thin stick in the bight of the hanks and altering the position on the supporting stick so that the yarn which was previously outside the liquor now becomes immersed.

The preparation of the yarn before dyeing is usually very simple and consists in steeping in cold water until thoroughly impregnated, the process often being accelerated by 'beating', after which the excess of water is removed by wringing. Such a preliminary treatment is quite insufficient to remove the natural impurities of cotton and this is recognised in some of the better class dyehouses, where the yarn is boiled out in a solution of carbonate of soda, which is far more efficacious than water alone in removing the natural wax, colour and dirt. This preliminary boiling is of importance, as the more efficiently it is carried out, the clearer and more even are the shades subsequently dyed upon the yarn.

"A type of dye vessel which is well suited to the dyeing of small lots of yarn is in fairly general use and consists of a rectangular vessel, some 45 inches long, 24 inches wide and 20 deep, set over a grate in brickwork and encased in cement. It is economical in space and permits, when not overloaded, of the yarn being efficiently worked in the dye liquor.

"6. In the dyehouses under European control, that is in the mills, jails, and the Basel Mission Factory at Cannanore, the conditions of course are adapted to the work to be done, but in Indian dyehouses it was only in a few that the conditions and arrangements were at all suitable for handling any large bulk of material.

"7. As was only to be expected, seeing that the dyeing industry here is so closely associated with that of weaving, it is chiefly in the form of yarn in the hank that fibres are dyed, but in Madras, Madura and other places, cloths are also dyed in the piece, or printed, and 'reserve' effects are produced by knotting with thread the parts to be reserved (bandhana dyeing) or painting over with melted wax, and 'ombre' effects by clamping the cloth and immersing only a part of it in the dye liquor.

"The shades demanded and the dyestuffs used vary according to the markets for which the material is intended and in towns quite close together the demands for the local trade may be very different. In one centre visited, special stress was laid upon the colours being fast, whilst in an adjacent town the trade demanded brightness of shade, and fastness was apparently of little moment. The question of fastness however is largely one of degree and may be—and is—differently interpreted by different people.

"8. The smallness of the scale upon which the majority of the dyers work, the absence of capital and the lack of knowledge of the principles of dyeing and the treatment of fibres, make it a matter of difficulty to see how they can be moved to progress, and to adopt more modern and suitable methods; they apparently live from hand to mouth with no reserve of capital to permit of their making any improvements which may be required in plant or buildings and above all there appears to be a general want of confidence between traders which precludes, I should think, the possibility of capital being advanced by outsiders. The standard of general [illegible] of the dyers interviewed was very low, their knowledge of dyeing [illegible] rule beyond the possession of the empirical data required for [illegible] shades which might be in demand in their immediate market, and in cases where outside competition had captured the market by supplying coloured yarns more suited to the trade, as regards fastness, properties, etc., they were at a loss to know how to regain their business. Their desires did not extend beyond "recipes" to assist them in carrying out the processes employed in the production of the better article, but that they themselves could make trials and gain information, even from failure to obtain the results aimed at, appeared to be quite foreign to their trend of thought. "Imitation" without any attempt at 'initiation' is evident in all that is done, the principles underlying treatment of fibres, and reasons for the different methods employed in the application of different classes of dyestuffs are quite unknown, and as there is never any interchange of ideas between dyers, each one is dependent upon what he has been taught by his father (or other member of his family) or upon what he gathers from travellers anxious to push certain wares. The general idea for meeting competition is not to improve the method or conditions of dyeing or the quality of the work, but consists rather in lowering the price, resorting to the use of inferior materials, or to methods of business which are still less to be commended. The lack of perception by purchasers of the difference between what is good and what is only poor value is responsible for cheapness being the deciding factor (and the question of quality becomes apparently but of minor importance) and it is little wonder that the quality of a lot of the dyeing done in Indian dyehouses is poor, for the prices paid in many districts do not permit of any but the lowest class work being supplied.

"9. A prevailing fault in the people engaged in the industry is the assumption that the processes of dyeing are secrets. It is this idea which may be considered as largely responsible for the failure to progress; for without stimulus from outside or interchange of idea, stagnation is all that can be expected and in isolating himself in order to preserve his 'secrets' the dyer cuts himself off from the only avenue for obtaining knowledge which was open to him. Each one seemed to think that his neighbour would learn something from him, but he failed to realise that it was possible for him to improve his own knowledge merely by the discussion of an everyday topic, and that fresh lights are thrown upon a subject and a stimulus given to ideas by casual conversation with people engaged in the same industry. In the majority of cases it has been with the greatest reluctance that any information with regard to the methods employed has been given to me, and very often inaccurate or misleading replies were received when the questions put could not be evaded. The more ignorant the dyer, the greater appeared to be his idea of the value of his knowledge, but in Madura and in other places where dyeing is carried on under better conditions, little difficulty was experienced, and information as to the processes and the dyestuffs employed was freely given.

"10. In plain dyeing it may be stated that there are no secrets, for the technology of the textile fibres is well understood and the dyeing process with almost all dyestuffs is comparatively simple. The complicated processes which are met with in India and which were in general use when natural dyestuffs only were available are traceable in the main to the difficulty in obtaining the chemicals required for developing or preparing the dyeware for dyeing. The variation in the recipes, or "improvements" by the dyer, were due to the variation in quality of the earths (dhobie's earth, etc.), ashes (wood ashes, kelp) and other substances employed; with pure chemicals at command, most of these intricacies disappear and any difficulty experienced in the dyeing with indigenous dyestuffs need only arise from the variable quality of the dyeware itself

"11. This question of the colouring power of the various natural dyewares is important and with products obtained at different times or from different places the dyer never knows until he has dyed his shade whether it is a 'match' or whether he has not to repeat the operations with quantities which, according to his judgment, will bring the dyeing up to the shade required. The procedure is simple when the quality is poorer than usual, for the shade can be built up, but when by chance the shade comes out too full, the dyer is often incapable of stripping the excess of colour without damaging the material.

"12. When visiting the various districts, I made special enquiries as to the places where indigenous dyestuffs were still in use, but with the exception of indigo it was only in isolated cases that the natural dyestuffs have withstood the competition of the imported artificial dyewares. In places in which a few years ago comparatively large quantities of natural dyewares had been employed, there was no market for them, the dyers preferring the powder products of the European colour firms. I did, however, here and there see the operations with indigenous products being carried out, or interviewed dyers who only recently had given them up, to take to the use of imported dyewares.

"The plant products which until recently were or are still in use are—

Turmeric (Curcuma longa).
Flowers of mudugu tree (Butea Frondosa).
Myrabolams (Terminalia chebula).
Annatto (Bixa Orellana).

Cutch (Acacia Catechu).
Safflower (Carthamus tinctorius).
Sappan wood (Caesalpinia Sappan).
Semburam bark (Ventilago Madraspatana).
Manjit (Rubia cordifolia).
Chay root (Oldenlandia umbellata).
Nuna root (Morinda citrifolia).
Sooranje (Morinda citrifolia).
Indigo (Indigofera Tinctoria, I. Sumatrana).
Kamela (Mallotus Philippinensis).
Lac (Tachardia lacca).
Jackwood (Artocarpus integrifolia).

* * * *

“ 15. The introduction of artificial dyestuffs can hardly be held alone responsible for the deterioration in the quality of Indian dyeing, for the same dyestuffs have been available all the world over and no one having any acquaintance with dyeing will deny that in Western countries the advancement in the art and practice was more rapid after the general adoption of these colours than before.

“ 16. What has been lacking in the Madras Presidency so far as I can see is the capacity to take advantage of improvements. The earliest cheapest anilines are still more extensively employed here, whereas in other countries they have long been superseded by improved colours of much superior quality. Not only so, the methods employed often bear no resemblance to those recommended by the makers (and proved to be the best in practice), simply because these methods entail a little more trouble and expense, and it will necessitate a radical change in the attitude of the people engaged in the industry and the methods under which it is carried on before any appreciable improvement can be looked for.”

* * *

and my summary included the following :—

* * *

“ 2. In Europe the dyeing industry may be said to be in the hands of men of some education and substance, who manage the works from a business point of view but who are not of necessity “ expert dyers ”, although they are well versed in the principles of dyeing, manipulation of fibres and other necessary details. The real dyeing is carried out under the supervision of the foreman dyer, who is responsible for the work done; he is expert in the handling of materials and in the matching of shades and usually has plenty of initiative, but being responsible for the quick delivery of work, up to the market standard, he is chary of employing new methods and processes until compelled by the force of circumstances to do so. Once its value is proved, however, he adopts an idea and turns it to real practical use. The incentive to adopt new methods usually has to come from the management, which, knowing the nature of the competition to be met, the prices ruling in the market and the prices at which work must be turned out to ensure a profit on the working, is in the best position to judge of the advisability of adopting new methods, plant or dyewares and in some branches of the trade the changes in the requirements are so rapid that it requires a keen intelligence and thorough knowledge of materials and processes to keep pace with them.

“ 3. Such conditions do not hold here and in the dyeing industry in Madras the absence of trained business men with technical knowledge is very noticeable. The demand made upon dyers is in the main, I think, for a product identical with what has been delivered in the past, but at a lower price if possible. The requirements as regards shade and fastness of colours remain practically stationary and new and improved dyes find slow, little or no recognition, simply because they are new and different from what has hitherto been used.

“ 4. The range of shades in use does not appear to be great, but to what extent this is due to customs and beliefs, to the tastes of the people or to the difficulty experienced in the past in producing a wide range by means of the indigenous dyewares, I am not in a position to say. Certain it is that I have not so far encountered in any country dyehouse a dyer who regularly produced a variety of tones by different combinations of the same dyestuffs. The art of rapid matching of any shade or tone with dyestuffs suitable to the market for which the material is intended is a prime necessity in a European dyer and he spends some years in quite a subordinate position as assistant, gradually learning this part of his business from the head dyer to whom, as often as not, he has paid a substantial premium to initiate him into the trade.

“ 5. The principles of colour matching are apparently understood to only a limited extent by the dyers in the Madras Presidency, who limit themselves, each one to the shades which have been in demand in his district for some time past and I have met with cases here where dyers have rejected dyestuffs of the very highest class as regards fastness and general properties, because the shades were not identical with those of a less suitable dyestuff which they were using when, by the admixture of very little of another colour, it would have been impossible for the purchaser to have differentiated one from the other except by the better behaviour of the new colour in wear.

"6. The use of weights and measures is also absolutely necessary in modern dyeing if shades are to be rapidly and accurately matched, for the dyer must know almost exactly the quantities of the various dyewares he requires for a given weight of material, if the shade is to be obtained at the first attempt, but in the Presidency here the range of shades in common use being limited, weights and scales and accurate measures are apparently very little used.

"7. Where an industry is carried on on a large scale, with efficient management and specialization in the various details of production, the advantages of apparently slight improvements are readily recognised, but we have in this Presidency to deal with very different conditions. The industry is, in general, in the hands of craftsmen, skilled in the application of materials with which long use has made them familiar but so deficient in knowledge of what lies outside their immediate environment that they cannot appreciate the conditions holding in other places. Customs, beliefs, secretiveness or suspicion, and isolation assist in the retention of old ideas and ways and what is distinctly lacking is a knowledge of the principles upon which the operations carried out in dyeing are based. The technology of textile fibres, comprising the nature and methods of treatment of textile fibres, the nature and properties of the drugs and chemicals employed in the bleaching, dyeing and general improvement in the appearance of the fibres, the effects of and removal of impurities from water, and the properties of the large number of dyestuffs which the dyer has at command, is practically quite unknown to the ordinary dyer here. There is no literature which would serve to increase his knowledge and the only assistance he has apparently had has come from the travellers and salesmen of the artificial colour works who, by means of recipes and practical demonstrations, have placed him in a position to use their products and have given him information, in an empirical way, with regard to problems connected with dyeing.

"8. The colour firms as a rule give instructions for the employment of their colours, which permit of the dyestuff being most economically and efficiently applied and these are usually closely followed, but the cases are numerous where variations have been attempted, or the instructions ignored and the powders dyed indiscriminately by the method affected by the dyer in question with results which could not be considered satisfactory. I have met with dyestuffs which required no mordant, only the use of a little salt and alkali in the dyebath, being dyed with alum as though it were a mordant colour; on the other hand, basic dyestuffs which require for their fixation upon cotton a preliminary mordanting operation with tannic acid and a metallic salt, are regularly dyed without any other treatment than one with dhobies' earth, and it is no wonder that such dyeings, obtained by means diametrically opposed to those recommended for the colours in question, yield shades which are the reverse of fast.

"9. A knowledge of chemistry, of the behaviour of fibres towards various reagents, and of the properties of different classes of dyestuffs, would assist the dyer to avoid the commoner faults, especially in dealing with the natural dyewares and products."

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"13. There is a tendency noticeable in some of the larger dyeing centres towards the erection of larger dyehouses by men with capital at disposal, but in many cases the courage might well be tempered with a little more discretion, for some of these gentlemen themselves have no knowledge of chemistry, practical dyeing, or the trade, and although it is in this direction that the best development of the industry may be accomplished, it is necessary for stability that those who direct such works should possess the necessary theoretical and practical knowledge to ensure that the work is economically and efficiently carried out. Should this trend continue, the conditions in the industry will be affected, as such places may be expected to work more economically in a steady market than the small dyehouses which are generally met with, and it would be advisable to prepare to meet the demand for education in matters appertaining to dyeing which the development is bound to create.

"The problems which arise in the handling of bulk lots of material with the assistance of machinery differ somewhat from those which are met with in dealing with small lots by hand, but all such problems can be dealt with by a man who has had the necessary technical training and understands the theory of the process which is being carried out.

"14. I would suggest therefore that means be provided in the Presidency for giving this technical training, but would point out that it cannot, or should not, be expected that in a school or technical institute, however well equipped, men can be trained so thoroughly that immediately they leave the institution they are able to take a controlling position in an industrial concern, for, besides a knowledge of materials and processes, such a position demands an experience of business methods and conditions which can only be obtained slowly and by direct contact".

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7. What I then wrote has been borne out by later experience and the demands made upon me by dyers have chiefly been for "recipes" with which to dye certain special colours in which the dyer in question was unable to compete with what was already on the market.

8. The value of technical aid in dyeing and weaving here is much restricted by the lack of variety in demand. There is a sameness in costume and the materials used for clothing which is in distinct contrast with what one experiences in other countries where fancy in dress and domicile have freer play and fashion changes rapidly, bringing with its changes fresh requirements which are an incentive to the inventive faculties and give a rich reward to those who can first meet the demands.

9. Practically the bulk of the requirements of India for coloured cloth could be met by using yarn dyed in the hank and as this is the easiest form in which yarn can be worked by hand, hank dyeing is the general dyeing process followed here. It is, however, by no means the most economical and in Europe dyeing at almost any other stage of manufacture is preferred, for in hank dyeing no machine has yet been invented which adequately replaces hand working whilst for all other stages mechanical aids have been perfected and permit of a production with which hand labour could not compete. There is not the same necessity therefore for the wide technical knowledge of processes and machinery which is required elsewhere.

10. Regarding the variety of cloths here in demand, turbans and body cloths, I suppose, are the main ones and comparatively recently there are shirtings and cotton coatings coming into use. There is no variation in the market for the first two beyond that of texture, but with shirtings especially there is a wide variation in the finish demanded by the market. I would indicate by this example the wide difference in the requirements which have to be met in India and in Europe. Here they are simple, there they are complicated and the dyeing industry there is not concerned with colour alone, and this on one class of material, but has to deal with questions of style and finish upon many varieties of cloth. A small idea of the extent of this variety may be gathered from the equipment found necessary in the mills in Bombay and Madras and when it is realised that this equipment is necessary for a limited market and even so requires to be controlled by specialists it will be evident that the dyeing industry in Europe is upon a different scale altogether to that which exists in India and that the technical knowledge required in dealing with the problems of Indian dyeing is not nearly so extensive as that which the industry elsewhere has accumulated. So long as the Indian industry remains almost entirely a hand industry, the requirements of the dyer will be met by improving his knowledge of materials and the technology of fibres, but no highly developed widespread industry demanding the same degree of technical knowledge as in Europe will arise in India until there is an increase in the standard of living of the general mass of the people accompanied by a widening of the demand as regards variety of material and treatment.

11. The difference between demands in India and Europe is undoubtedly due to climatic causes which are unalterable and, as I have tried to indicate, there is a gulf between the modern machine dyeing industry which requires technical supervision at every stage and the hand dyeing industry which only values technical knowledge when its application results in a lowering of the costs of production.

12. My experience here has been that the advice upon real technical matters requested of me by dyers was often with regard to points which were of common general knowledge to western dyers and such as are dealt with in the literature on the subject. The lack of contact with any literature must have a stultifying effect, but this has been minimized by the filtering through of western knowledge following the introduction of the synthetic dyes and the contact with the sellers of these dyes. Technical and scientific aid of value to the Indian dyer cannot be given except by a specialist with a very wide experience, for whether it be on cotton, or silk (there is practically no wool dyeing in the Presidency) with alizarin, indigo, ordinary colours or mineral colours, when the dyer seeks advice it is as a practical man and the advice tendered must be practical and not based upon theoretical knowledge only. The expert must get into direct touch with the workers, but this is a matter of difficulty and the simplest plan would be for him to have trained assistants, with a regular tour programme, reporting to him and, accompanied by them, his visits to dyers in need of his advice would keep him in touch with requirements. But until the general education of the dyers is vastly improved, and the demands made upon them rise above the level at which they can be most efficiently and economically met by hand labour, the sphere of usefulness of expert assistance in dyeing is limited and assistance can best be given, I think, by directing the attention of workers to developments elsewhere and spreading a knowledge of the principles upon which such developments are based.

ORAL EVIDENCE, [illegible]TH JANUARY 1917.

President.—Q. In your written statement you give the [illegible] dyeing industry, but you do not tell [illegible]

In the commencement of 1911.

Q. The report was submitted in August?—*A.* It was called for very quickly.

Q. And your conclusions in the report were based on the investigations made during those seven or eight months?—*A.* Yes. The opinion there expressed has been confirmed by later experience.

Q. What research work did you do after that to check the value of vegetable dyes?—*A.* The nature of natural dyes had been pretty well studied and their value pretty well appreciated before the war.

Q. After 1911 you continued this work?—*A.* I was dyeing expert all the time in the presidency.

Q. From 1911 what arrangements did you make to take up research work on vegetable dyes?—*A.* I did not think it was a question worth considering at the time—that is considering the conditions of the dyeing industry.

Q. You did not follow up your research work from 1911?—*A.* No.

Q. Did you not think it might be possible, in view of the primitive methods that were adopted for using vegetable dyes, to improve either the dyes themselves or the method of treatment, by further research?—*A.* I do not agree that the methods which are in use are so crude. Alizarin dyeing is based upon the method which was evolved as far as we can gather, about 2,000 years ago. It is simply that our knowledge of the process upon which that method is based has improved.

Q. You say that there is nothing for the dyer to learn in that way in India, nothing to improve his method?—*A.* It would improve slightly by his knowledge of the reasons for the selection of certain materials and processes being improved. But his method is largely based upon the question of profits and he would alter a method which is perfectly sound if he could cheapen it and produce his dye at a slightly cheaper rate.

Q. You say that his methods are the result of long evolution and are practically perfect?—*A.* With the natural dyes.

Q. And you could not improve upon them no matter what you did?—*A.* No. They have been improved in the West a little bit with the aid of machinery and so on, but that is not research upon the natural dye itself.

Q. The colours obtained by these dyes were not satisfactory. Is that due to the colours themselves being imperfect, or is it due to the accompanying resin or anything of that kind?—*A.* The question of shades is decided by the market demand and this is the only thing which decides what colours are produced. If there is a demand for a certain colour it will be produced and the demand in the past would no doubt be met by the colours. When the synthetic dyes began to come in, a demand was created and that demand was not met by the natural dyes which had been used before.

Q. Synthetic dyes were imported by the agents of the German colour firms and they toured throughout the country and demonstrated the use of these garish dyes and spoilt the taste of the people?—*A.* No. They provided dyes which permitted the people to satisfy their taste for brightness.

Q. And in this way they established confidence?—*A.* Yes.

Q. And you think that what they did in that respect was in conformity with good taste?—*A.* I simply take the demands of the people as the requirement to be fulfilled.

Q. The people required these bright shades and the colour works supplied them?—*A.* Yes.

Q. Do you think that it is hopeless to try and get them to change that taste now?—*A.* Quite, I think.

Q. And you could not approach these bright colours with vegetable dyes?—*A.* It is all a question of material and shade—the material to be dyed (being cotton, or wool or silk) and the shade to be obtained.

Q. At present you could not do it?—*A.* With certain shades the matter is quite easy. Take cochineal. It has a beautiful shade upon silk and will meet all requirements. It is of no use for cotton but alizarin upon cotton gives a shade with the ordinary method of great purity and brightness but requires a very expensive treatment to make it complete.

Q. When synthetic indigo was on the market, the demand for natural indigo diminished?—*A.* There are many other colours which compete with indigo.

Q. Indigo had to give way before synthetic indigo?—*A.* It is diminishing very quickly.

Q. Do you think that further research work on indigo would save the situation?—*A.* No. Upon the chemical part of the indigo question, I do not think research is required. By chemical part I mean the dyeing part, the preparation of the dye for use in dyeing.

Q. Can the actual manufacture of the indigo be improved upon?—*A.* If you can arrange to remove from the natural indigo the large amount of accompanying non-dyeing matter, the product will be brought more in conformity with what is required by the dyer, but that question is not of so much interest to the dyer as to the agriculturist.

Q. You think that indigo can be improved by better agriculture?—*A*. I think so. I say that it is the only hope for it.

Q. There is nothing in the process of manufacture that would help the indigo industry?—*A*. With the exception of putting it before dyers in a form in which they can dye it with very little trouble.

Q. Do you know anything about the fermentation process which is required for the manufacture of indigo from the indigo plant?—*A*. Only from the general literature. I have never made a special study of it. I have seen the literature in dyeing text-books.

Q. How old is that?—*A*. 1905 or 1906.

Q. Do you remember what the fermentation process is like?—*A*. That has only been settled quite recently. In fact, I may say that it is still an open question. The general idea was that it was a bacterial fermentation.

Q. But does not research work in that direction open up quite a new field of improving the process of manufacture?—*A*. It does distinctly.

Q. What makes you think that it is mainly an agricultural question?—*A*. Well, because it is carried out in connection with the agricultural side. I include the extraction from the leaves in the agricultural side as it is carried out by the growers. My interest from the dyeing point of view begins from the point when it gets into the hands of the dyer.

Q. You do not take any interest on the other side?—*A*. I want the colour ready made.

Q. You do not go further back with the researches?—*A*. No.

Q. And that is why you have not taken any interest in the vegetable dyes to produce a better dye from the same plant?—*A*. My reason is that each vegetable dye practically requires a special method of dyeing and each of these methods is a distinct separate one. If you want to get a certain shade with three different natural dye-stuffs, you have to use three separate methods of dyeing. The intermediate processes are very tedious with the result that the expenses of dyeing increase enormously, so that the dyer naturally turns to those dyes which can be dyed at one and the same time and give him his shade in one operation.

Q. Have you practically given up your activities in dyeing here?—*A*. I have been forced.

Q. And since then you have been in general charge of paper pulp experiments for the Department of Industries?—*A*. Yes, giving what assistance I can to the department.

Q. You are in charge of a pencil factory?—*A*. Yes.

Q. Is it wise to give up your own particular line of work and take up another line in which you are not in the same way interested?—*A*. It is not really, I have made it perfectly clear as to the limitations under which I can advise and I tell candidly where I can be of no assistance.

Q. Do you think that there is nothing to be done in the Madras Presidency in the way of dyeing operations at present? You cannot use your knowledge for teaching the people?—*A*. That is what I suggested. To that extent my recommendations went on to the Madras Government, as the only real line in which the matter can be assisted is by spreading a knowledge of the technology of the process.

Q. You think you ought to be doing something in that line now instead of looking after a pencil factory?—*A*. We are awaiting the building of the Technical Institute at Madura.

Q. In the meanwhile, there is nothing which you can possibly do in the way of dyeing, either in the way of research work, or testing work or something of that kind?—*A*. Proposals have been put forward with regard to testing and so on. Again the question of buildings and finance arose.

Q. Everything depends upon that building?—*A*. Yes. It will be finished in about a year.

Q. How long has it been in building?—*A*. Perhaps four years. There was difficulty as regards site and the scheme of working.

Q. You will have to get a certain amount of plant for it?—*A*. I have a certain stock of chemicals ready. I have got all the apparatus required from England.

Q. In Cawnpore there are a large number of young men who can be trained in dyeing and they use both the vegetable and mineral dyes. They are willing to go very long distances and they pay apparently good fees for their training. Do you think there is any feeling of that sort in this presidency?—*A*. Yes. We have many demands for instruction, but very often from people who, I do not think, will be able to take advantage of it.

Q. You would not encourage them to receive instruction?—*A*. No.

Q. Have you done anything in the way of training Indians who know the thing, so that they can go out and act as demonstrators to the dyers in the villages?—*A*. They are a few who are already trained. They had already been trained in other institutions.

Q. Have they been doing good work?—*A*. Yes.

Q. Have you continued the process of training such men?—*A.* No, because there is no building and no institute.

Q. Is there no building of any kind there in which this can be done?—*A.* I did have a small room which I used as laboratory, but with the conditions there it is quite impossible to do any good work.

Q. Does it require any large and great equipment to teach young men the simple processes of dyeing and the like?—*A.* They knew the simple processes of dyeing.

Q. Could you improve upon them in any way?—*A.* It is a very difficult question.

Mr. A. Chatterton.—*Q.* You came out in 1911?—*A.* Yes.

Q. To which department were you appointed in London?—*A.* I was scheduled at first to the Department of Industries, to report myself to the Superintendent of Industrial Education.

Q. You are now in the Department of Industries?—*A.* Yes.

Q. You have been allowed to undertake private practice?—*A.* Yes. That is in my original agreement.

Q. You are now in the department on a fixed pay?—*A.* Yes.

Q. In this connection do you think it is a matter of any very great advantage that experts coming out here should enjoy that right of having private practice?—*A.* I do not think it makes any difference.

Q. Do you think that it would attract better men?—*A.* I do not think so.

Q. Or do you think it will be of any material advantage to the man if he is allowed to engage in private practice like this?—*A.* Certainly not in dyeing. I doubt very much whether the fees he would get in the shape of private practice would pay him at all.

Q. Coming to the question of vegetable dyes, is it not a fact that even under war conditions, the cost of preparing most of these vegetable dyes and using them suitably is so high as to make their use prohibitive?—*A.* That is not only the general opinion but the general result of experience. The men who have tried and used vegetable dyes before, tried to take up the use of roots again and found that even at the high prices at which alizarin was selling, they could not produce their yarns at the same rate with the vegetable dye-stuff as they could with alizarin. I may say with regard to the question of purifying the product, that the opinion I came to on the expense of producing this so as to make the root comparable as regards purity of shade with the alizarin, is borne out by the attempts made in the north of India at Dehra Dun Research Institute where they came to the conclusion that the cost of producing such a purified material places it out of court for practical use.

President.—*Q.* Who made out the cost?—*A.* Dr. Purnam Singh. He went into the whole question of cost. I gathered that from an interview which I saw in the "Pioneer" at the time.

Q. What steps did you take to verify this report in the "Pioneer"?—*A.* I simply wrote to him and he confirmed that.

Q. Did he give any detailed statement of costs?—*A.* No. He simply said that he agreed with my opinions and statements.

Q. You do not know what experiments he made and on what scale they were made?—*A.* No.

Mr. A. Chatterton.—*Q.* It has been suggested that the experiments which you made at Bangalore were rather hurriedly made and that they were not made on a sufficiently large scale and in sufficient detail to allow of the definite conclusions to be drawn, which you have drawn, in regard to the future?—*A.* If I knew nothing about the subject and took up any investigation, I have no doubt that it would require to be an elaborate investigation. From my knowledge of the industry and the use of the materials, I can say that the matter is going to be a very very difficult one to put dye on the market and it is just a question whether research upon that line is justified. If there was any hope of quantities being obtainable in sufficient amounts to keep the industry going and at prices which would permit of their economical use, then it would be quite feasible, but where you are met with the condition that you cannot get sufficient raw material it makes it a question whether it is really worth while going on with it, and that is my experience with regard to the only raw materials which are really used in this Presidency. After six months I understood that about 5,000 pounds of roots were obtainable. One town in this Presidency would require about 5,000 tons a year and that was a matter, and other practical considerations also which would help me to a conclusion.

Q. What is the conclusion you came to in respect of one particular dye material which might be possibly obtained in large quantities, that is, lac, with regard to the dyeing of cotton goods?—*A.* Lac gave a shade at great trouble which was so thin as to have very little attraction for an Indian dyer. It is a nice shade from the point of view of Europeans, but a nice pale rose pink shade is of no interest to the Indian.

Q. In that particular case is it practicable to produce much brighter shades by using other mordants?—*A*. The difficulty is that lac is never used upon cotton, whereas upon silk it gives a very good shade, and it is not a material which has any value for cotton whatsoever.

Q. But can you not produce a satisfactory result with certain mixtures?—*A*. It can only produce a very thin shade under whatever conditions it is dyed.

Q. There is only one other point that I want to know. What is the difference between alizarin which is produced synthetically and the dyeing principle of madder?—*A*. Madder contains many dyeing principles, but the important and the main principle is alizarin.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. Do you think that unless these weavers are educated they will be unable to follow the instructions given by your department?—*A*. I think it is almost unthinkable that there should be much improvement without better education. I would say not only literary education but education in common things.

Q. But you want the education to be in English?—*A*. That is not necessary. I simply look upon education as a training as a widening of adaptability.

Q. In paragraph 8 you say that colour firms went and gave instructions for the employment of their colours. Were these German firms?—*A*. They sent their experts all over the country.

Q. Did they teach them how to work these colours with more economy?—*A*. In general they gave the best dyeing principles, and the Indian buyer very often, for the sake of showing that he had a special process of his own, would make alterations, but the general result was deterioration or increase in cost. That is a very common experience.

Q. He does not follow the instructions completely?—*A*. No.

Q. In one of your paragraphs you say that unless there is a big dyehouse the people will not be able to work economically. Is it so?—*A*. It all depends upon the condition of dyeing. If you want a high class dye at a cheap rate you can do that only when it is worked on a large scale. The condition under which the Indian dyer works is for cheapness and his product is commensurate with his method of working but it is not of good value, but being cheap it finds a market.

Q. If there is less production the cost goes up?—*A*. Yes, and that, I think, may be generally taken, that the costs which are incurred upon a smaller production work out higher on the unit than those incurred on a bigger production.

Q. On our side, these private dyers are able to compete with the big mills?—*A*. That is so here. In their own markets they compete very efficiently with mills.

Q. Do they generally use natural indigo or the synthetic sort?—*A*. It is difficult to say with regard to the use of natural indigo, because it was grown in the district, and it never came to the market but went direct to the dyer, and it is difficult to say to what extent natural indigo was used. But it is certainly a fact that the amount of synthetic indigo coming in was increasing.

Q. Are you going to have a big dyehouse at Madura?—*A*. I specified an experimental dyehouse, but seeing that the education I have foreshadowed was largely technological I was placing most reliance upon laboratories.

Q. What class of students would you require?—*A*. At first I would restrict instruction to members of the dyeing class.

Q. What about their education which you want first?—*A*. As I have pointed out, the Sourashtra community is maintaining a high school and I saw evidence in other towns that the ideas with regard to education were improving, and it was simply a question of time before we had a class of men, who were engaged in dyeing, with sufficient education to really take advantage of instruction.

Q. But don't you think that some of the people who have been educated in the colleges should be taken as your assistants so that they can go about and show the various processes to the people in different places?—*A*. That would arise in time, but I should prefer a man with practical acquaintance of the business than one who had simply theoretical training. That is what you find with the dyers. They respect practical knowledge, and if you do not know as much as they know you are not of much use to them. I differentiate between "people who write in the Press" and "dyers."

Q. You are very pessimistic and you say that the people do not care for your views and work. You say that there should be regular assistants touring in the districts?—*A*. That I thought was the best way of getting at the actual dyeing trade.

Q. Do you largely produce coloured cloth in Madras?—*A*. All yarn woven. Coloured cloths are practically all yarn dyed. The only method of bleaching followed is sun bleaching.

Q. You are going to teach them the same process about bleaching too?—*A*. I started my class, explaining a method of bleaching which I thought to be most suitable to conditions in India, and a few months afterwards I saw a student who happened to be attending my classes, posing as a bleaching expert with the process I have shown him. It was the permanganate process, which is very suitable for high class goods. It is rather expensive however for ordinary work.

Hon'ble Pandit M. M. Malaviya.—*Q*. Don't you think that in view of what you say regarding the ignorance of the general dyeing community or those who take to dyeing you could employ your time more usefully in publishing pamphlets and leaflets giving information on the subject?—*A*. That is that I should write out a series of recipés.

Q. And also general information as to the progress which the dyeing industry has made, etc., to create that sort of interest, the lack of which you think is responsible for the want of improvement in this industry in India?—*A*. The question did arise with regard to making certain publications and was taken up again only just a short time ago.

Q. Suppose you conveyed some information regarding the principles underlying the art, that is, general information, and also particular instruction as regards certain processes and conditions?—*A*. To do that I have to refer to certain principles of chemistry which are absolutely unknown to the people.

Q. Would they not become known if you explained them in the vernacular and if you also sent out assistants to lecture to the weavers on the subject—would you not thus promote a knowledge of the art of dyeing much better than you could by having one Central Institute?—*A*. That was a proposal which I had in view and which I have mentioned here, that is, having assistants going throughout the presidency. But to inculcate a real knowledge of the principles you cannot do that with men who have no grounding at all in general education, because you bring in and deal with things which are absolutely foreign to their minds, and of which they have no knowledge whatever.

Q. I entirely agree with you as to the necessity of general elementary education with a little knowledge of elementary science and chemistry, but pending the provision of that education, to deal with the grown up class of men who practise dyeing, I suggest to you that you might publish pamphlets such as I have indicated to you and have assistants going about the country to instruct the weavers in this trade?—*A*. I have been dealing more in the way of correspondence. When dyers apply to me or place their difficulties before me, I give them my advice. To publish a pamphlet in general, it might get into the hands of "outside" people and put them in the way of competing with those who have been employed in dyeing before. The industry is in most cases on such a small scale that men with very little knowledge will come in and it can only result in widening the competition with the men who are already engaged in the trade.

Q. But in view of the general benefit that is likely to arise could you not disregard that general competition?—*A*. No. The general benefit could best be met by trying to place the industry on a proper basis.

Q. My suggestion is supplementary to your recommendation—to inculcate a better knowledge of the art in those whom you cannot expect to attract to the central institute?—*A*. The dyer in general is more an ordinary workman—a hand worker—and he can be reached only by recipes, and to enter into a discursive treatment in a pamphlet would be too much for him, and that is why we wanted to restrict the admissions to such persons as would be able to take real advantage of the instruction.

Q. Does the British foreman dyer possess much elementary scientific knowledge?—*A*. No; many of them do. Many of them attend night schools and take up the question of chemistry but very seldom does the amount they learn permit of their solving the problems which arise in their work. He is simply a dyer, but is living with men who are engaged in all sorts of industrial occupations and his keenness is such that he "reads" He is different from those in India where the man has a very limited environment and outlook. Besides, the English dyer goes through a long apprenticeship.

Q. Surely the work for which you have been particularly engaged could be better promoted if time were devoted to the spread of a knowledge of the art than given to other departments?—*A*. I desired to spread knowledge of what was done under proper conditions, which I thought would be of real value, and not as we are used to seeing so often, doing something for the sake of doing something, with no value.

Q. Why do you want to restrict instruction in the dyeing school to pupils who could ensure their subsequent employment How many persons can say what fortune awaits them?—*A*. I say "until." But for the present there is no doubt that a man taking up dyeing cannot find employment except in the mills.

Q. But suppose a pupil goes to you to learn, is it necessary that you should be sure of what he is going to do in the future before you should agree to teach him. Is that not more the concern of his guardian?—*A*. The influence of the guardian seems to have little weight.

Q. Is there any such restriction exercised in an English dyeing school?—*A*. No.

Q. Why do you want to introduce it here?—*A*. Because in an English school the man enters it with his eyes open, and the number of places in which he can find employment is very large indeed, but in India unless a man has been brought up among the dyeing community he cannot hope of finding employment as an assistant.

Q. The Government has opened many institutions, many educational institutions which are availed of by students in large numbers, and many of them do not find employment after they have finished their education, but there is no restriction on that score imposed upon their admission into those institutions?—*A*. When a young man comes to me and says, "You advised me to do so and so, and now I find it has led me nowhere." I consider he would be justified in holding me responsible.

Q. Assuming he learns the art which he comes to you for and develops a taste for it, is he not likely to use it to his advantage?—*A*. If he has not got capital and has not got the business knowledge.

Q. How do you know that he will not have the capital? He may find somebody willing to employ him. You cannot have any data to decide whether a pupil who goes to you will have the capital to utilise the knowledge he may acquire, whether he will find any employment or not? It is a mere surmise that you can make?—*A*. Yes, with experience of actual happenings.

Q. Do you know that this desire to restrict teaching in these arts to sons of artisans has led in more than one instance, in more than one province, to the schools not having been availed of by students in general?—*A*. I do not know that.

Q. In the United Provinces we have had such a result, for instance in the weaving school at Benares where instruction was limited to sons of weavers. If that restriction were not applied, many more young men would probably have gone in to learn that trade?—*A*. My restriction of what I consider connection with the trade is rather wider than that. I do not take the weaver only as a man interested in dyeing. The merchant is also interested in dyeing and therefore to me it has a much wider scope than that. I would admit anybody who has any connection with the dyeing trade, but I would cut out those whose tastes were purely literary.

President.—*Q*. You want a staff to demonstrate for this dyeing school?—*A*. I have asked for an assistant chemist and an assistant for dyeing.

Q. Are they being trained?—*A*. I want only an assistant for dyeing. Assistants for teaching chemistry are available.

Q. You do nothing in the way of sending out young men to the districts to teach dyeing?—*A*. I know where we can find men for that work as well.

Hon'ble Pandit M. M. Malaviya.—*Q*. You say that the representatives of German colour firms have affected the tastes of the people, do you think that if you had assistants to go about and lecture on these subjects they would be able to change the tastes of the people in favour of indigenous dyes?—*A*. I do not think so.

Q. In view of the large amount of raw materials and the cheap labour that you have, do you not think that if the dyeing material were made available at cheaper rates, you could encourage the manufacture of indigenous dyes? I am directing my mind to the nature of the dye-stuffs, to the indigenous dyes of the finer kind as compared with the aniline dyes. Don't you think that if these indigenous dyes were made more easily available, in spite of their not being as cheap as aniline dyes, there would be a market for them owing to their superior quality?—*A*. It is quite a mistaken idea that the indigenous dyes are superior to the synthetic dyes.

Q. Are they not superior in the aesthetic sense?—*A*. Even the satisfaction of the aesthetic sense is a matter for the dyer. The consumer sets the demand and the dyer satisfies it.

Q. Have you noted that the old indigenous dyes still compare very favourably with the aniline dyes and are, in fact, better both in durability and effect on the sight?—*A*. No. the natural dyes cannot stand either for shade or beauty or things of the kind.

Q. Have you in your mind the dyes of some of the old carpets which you might have seen?—*A*. I have not seen those carpets at the time of manufacture. Softening might have taken place. I remember a lecture about eighteen months ago in Amritsar where there was a debate on the question whether the natural dyes are far superior to the synthetic dyes, and the Chairman (Mr. Hill) said that his best carpets were made with synthetic dyes, although the natural dyes are cheaper, and the special synthetic dyes are more expensive in their use. It is a question of what the demand is, and for cheap wares cheap dyes are in place whilst for high class goods dyes suitable to the requirements are available. I saw the report in the "Daily Press."

Q. Have you been to the Basel Mission factory in Cannanore?—*A*. I was there in my tours.

Q. What dyes do they use?—*A*. Anilines, or what I call synthetic.

Mr. C. E. Low.—*Q*. You say you are allowed to take up private practice. Have you done any private practice for the mills?—*A*. In one instance.

Q. Why it is not possible to send out peripatetic instruction parties at present?—*A*. The dyeing trade is at present in an awful condition owing to yarn and dye-stuff prices. There is very little dyeing work.

Q. Would it not have been possible before the war?—*A.* We were hardly ready for that. We hoped to be at work with the instructional scheme and this would come up as a natural corollary.

Q. What has hung up the construction of this building?—*A.* I think plans were drawn up which were not found quite suitable after scrutiny.

Hon'ble Pandit M. M. Malaviya.—*Q.* What assistants have you working under you?—*A.* I have none at present.

Q. Since you came you have never had any assistant working under you?—*A.* Only for a short time privately, a man engaged by myself.

Q. Is there any Indian who is learning this art of dyeing?—*A.* Many.

Q. Educated men?—*A.* Yes, with a good knowledge of the principles.

Q. Educated here in India?—*A.* Yes, as well as outside too.

Q. Don't you think that if you had some assistants like that under you they would go about and spread a knowledge of the art of dyeing?—*A.* That is what I have in view. That is part of my scheme.

President.—*Q.* You have not been to Cawnpore to see the work that they have done?—*A.* I saw the Director of Industries, Cawnpore, but it is now nearly two years ago.

Q. You have not actually been there to see their results?—*A.* No.

WITNESS No. 217.

MR. C. S. RAMACHANDRAN, *Supervisor, Department of Industries, Madras.*

WRITTEN EVIDENCE.

Capital. It is often remarked that Indian money does not easily come forward for industrial enterprises. It does not and cannot when the necessity and opportunity for it do not exist. India is a big agricultural country and it can command a good deal of wealth for industrial enterprises. I have had experience with the agricultural public. I had to deal with them in several districts of the Presidency and when cases arose for their agricultural improvement, I found that most of them were able to command money for investment on agricultural plant. Looking at the phenominal installations of rice hulling plants in the Tanjore district and elsewhere, anybody could question the statement that Indian money is immobile and that India is too poor for industries. When a proper case has been made out for promoting any new industry, there will not be the least difficulty to find money for it. No doubt the prevailing rate of interest in the money market is high (and it will be and is, so in all agricultural countries) and this circumstance offers a certain amount of resistance for the money to flow in all directions quite smoothly. But this hindrance cannot affect the savings of all classes of individuals and so any amount of money for promising enterprises can be found in India. There is much talk about the hoarded wealth of India by economists, and, whether there is hoarded wealth or not, there is enough potential wealth which can come forward for profitable concerns. The sure way to guide the wealth of India into any industry is to point out that there is profit in the industry and that it can be pursued in India.

Governm assistance *Q.* 5 (1-2).—Money grants-in-aid bounties and subsidies will be futile for existing industries and will be justifiable as regards new industries not initiated by Government. In the former class of industries, such bounties or grants-in-aid will be throwing good money on a bad bargain in certain cases and in the latter, it will be a necessary incentive for private enterprise to make a persistent effort to come out successful in a new industry.

(3) Guarantee of dividends by Government is absolutely unnecessary and will be baneful in its working. When the guarantee is there Government interference will be necessary to a certain extent and will get too complicated for management.

(4) It is open to Government to grant loans bearing no interest for a period, limited to new industries, but when the industry begins to pay dividend the Government money should be either withdrawn or should bear ordinary rates of interest. As regards existing industries loans may be given by Government bearing interest for a short period when a company is floated on sound lines but even then, the Government should be ready to withdraw when private money would get into the enterprise. In both cases, so long as Government has its money in the enterprise, Government should be given a voice in the control.

(5) In most cases, capital for industrial enterprises is drawn from merchants or money lenders. Supplying machinery on hire purchase system will not serve any useful purpose. It will give a very transitory relief unless the period is nothing short of 5 or even 10 years. If this is done, the plant or machinery in many cases will get worn out to such an extent that any security on the plant alone is meaningless; on the other hand if collateral security also is to be furnished it is quite open for the private

party to find the required money from other sources and pay full. I had experience of similar transactions when I was a supervisor in the Pumping and Boring Department. It was brought to me that if Government does not interfere, it is open to the individual purchaser to bargain with the firms and obtain cheap. This may be partially true and it will be impossible for Government to completely satisfy individual purchasers of plant and machinery as regards prices, and Government takes the responsibility for prices when hirepurchase system is in force.

(6) Provision of part of share capital of companies is unnecessary except perhaps in new industries. Even here when pioneering work is done exhaustively it will be unnecessary that Government should take further steps by putting in capital of its own unless the success of the industry is doubted to some extent.

It may happen that Government would like to give up pioneering work at a certain stage. It will be a stage when it pays but the Government would not have made good the expenditure incurred in its investigation. If for certain causes Government wish to sever its connection before it makes good the expenditure incurred, it may provide part of share capital and exert its further influence so that the ultimate fate of the industry may not be of a doubtful nature.

(7) Provided that the products of the factory are of a tolerable and standard quality and provided that the price is on a par with the average of the previous 5 or 10 years (Government purchase rates) it is perfectly reasonable that Government should guarantee purchase for a long period. Such guarantee will be a very good advertisement and will save the company from the trouble of finding an outlet for its finished articles. Indigenous articles of manufacture are likely to be thrown out on the ground that they are not up to the standard but when such rejections are made by Government the decision should not be open to criticism.

Q. 6.—When Government provides part of the share capital, there must be Government control vested with the Director of Industries. It should be open to the Director to enter into all details of the working and have as much right as any other Director of the company has. When there is Government money without interest, the influence of the Government should not go further than obtaining information as regards the stability of the concern with reference to the Government money involved. The Local Government concerned on the recommendation of the Director of Industries should decide when the money invested should be withdrawn. The Provincial Accountant-General and the Director of Industries must be furnished with a balance sheet for each year so that they may know progress.

Pioneer factories.

Qs. 7-8.—I am undergoing experience in a Government pioneer factory and I may have to modify to some extent my existing opinions in the light of further experience. Pioneering work in India is beset with greater difficulties than in Europe or America for the reason that there are not in India established correlated industries which will help the solution of various minor questions that arise in promoting a particular industry. It is believed that it will be a short time affair for pioneering. On the contrary it must take a long time when the country has not many large industrial concerns which are essential for easy and quick growth of new industries. Any new industry is not expected to pay within anything like four or five years even in advanced countries like Europe while, in the case of India, it may take a little longer time and it should be the function of Government, when it pioneers a particular industry, that it continues working it till it realises all the money spent on it. But if it sees clearly that it cannot within a reasonable time, it would do well to hand it over to a private company but keep active connection with it till it makes good profit for a number of years.

In pioneer factories, there must be two sections or two forms of control, one dealing with the purely industrial side and another with the experimental side. The two must be kept separate as far as possible.

Collecting data of costs of production when there is no provision for supply of materials and when the labour is not trained to a tolerable extent will be premature. It will be necessary to work for several months before things assume a shape which will facilitate systematic production on a regular scale for some months without a hitch. If experts are to be appointed for pioneering, it must be determined if they would be helpful in solving all issues that arise as subsidiary problems and if they would train a certain number of men that would carry on the industry in an efficient manner after about four or five years. It is no good saying that there are not men for industries in India and it appears to me that when there are men for other professions, there must be men for industries also. In the case of all pioneering work, the work must be carried out to a limit when commercial production is thinkable. Commercial production on regular lines must be carried for at least two or three years when there will be opportunity to overhaul the results of experiments and reach a definite line for practical work. When this definite line is reached and production is found to be satisfactory on all points as regards price, quality, market, and materials, a case will arise for handing over to private management. When it is so handed over it will be desirable that Government bear the charges of management for a further period of a year or two and keeps friendly eye on progress for a limited number of years.

Pioneer factories can be converted into permanent Government enterprises when the Government have to purchase the materials of manufacture in the open market. When the total quantity required by all the provincial Governments will justify a factory it will be a fit case for Government enterprise provided that no private enterprise will follow from Government pioneering.

Limits of Government assistance.

Q. 14.—An established external trade must naturally offer impediment for internal development of industries. With an existing organisation for an established trade it will be impossible for young industries to thrive unless in an appropriate manner Government will help local development by pioneering and patronage of purchase, etc., as indicated above.

Government should come forward to aid, without any limitation whatever in such industries as are specialised only in a few countries of the world. There are a number of materials of foreign (other than British or Indian) production which find a market in India and it will be up to Government to see if such articles can be produced locally. This may to a certain excite the commercial public but such a complaint should be ignored.

Technical aid.

When Government experts are lent to private firms or companies that are running an established industry the firms concerned should meet entirely the charges of the expert. But if the private body are dealing with a new industry Government may use their discretion in meeting the expert's charges partly or wholly. If the private company meets the expert's charges the results of researches should be available for the individual company and Government should have the entire right over such results under certain workable conditions. If the expert has no claim on the result, it is doubtful if either Government or any private company will have the possible advantage from an expert. Government may offer adequate bonus to the expert for useful results in addition to his regular fee or salary.

Demonstration factories.

Qs. 19-20.—Government demonstration factories are unnecessary. To serve the same purpose, existing industrial concerns can be addressed with a view to improve their methods and they may be offered ways and means to carry out the experiments in view. The success or failure of any demonstration can then be judged easily as when it is a success, the factories concerned would adopt the system or method propagated which is the aim of such demonstrations. Such demonstration results should be available for all factories and the individual factory chosen for demonstration purposes should not have any special advantage for having accommodated.

Research abroad.

Qs. 21-23.—The provision for research in India cannot be made to meet all requirements in all directions for sometime to come. Again as regards new industries, owing to the prevailing local ignorance it should be necessary to provide for research in the United Kingdom or abroad, with reference to the specific direction in which closer knowledge is required to meet the local requirements.

Q. 24.—The Science Congress may perhaps be able to meet in a way, but then there will be difficulty in making the industrialists refer their problems to the Congress, and the Congress again to accept the onus of solving them. But if there is an Industrial Congress similar to the Science Congress, there will be an occasion for the several industrialists to come in contact with each other and benefit by interchange of thought and experience.

Industrial surveys.

Q. 25.—I am not aware whether any accurate knowledge exists as regards the quantity price, etc., of forest and mineral wealth of India. Rough figures are most often given but I have not come across any correct figures or ideas about these. It seems to me that surveys may be required to make them useful for industrialists These surveys can be usefully made if the Forest or Geological Department would collaborate with an industrialist who, no matter if he is not an expert, can realise how such a survey could serve his purpose.

Training of labour and supervision.

In any new industry labourers can be trained in their jobs and improved in their efficiency by affording sufficient raw materials to work with and employing large supervision staff to put them in the way till they get familiar with their work.

Apprenticeship in a premier workshop or factory carries with it superior advantages over the industrial school training (as it is at present). In the former the man not only obtains skill in his trade in a thorough and workable manner but is fit for industrial work as he comes out of his apprenticeship. The industrial school training, on the other hand, involves further training before a man is useful as a skilled labourer. In some factories or workshops, apprentices have an easy time of it but if they are treated very much as other labourers, the result will be completely satisfactory. Unfortunately many factories cannot afford to admit a large number of apprentices as these novices will waste materials and be a permanent halter round the neck of the factory. There is therefore a certain limitation for entertaining apprenticeships in premier factories. To obviate this, industrial schools will come in. Now the men sent to industrial schools have not got just the same opportunity of obtaining practical skill as in a premier factory or workshop. To make the industrial school training useful for training skilled labour, there must be a factory side and school side. The latter can be left out of account except for the training of superior labourers who will have to handle and control a small body of men. In the factory side the conditions must be exactly the same as would obtain in a normal factory. There must be a body of highly skilled artisans who must put the apprentices in the way. In this there will be a certain amount of waste during the initial stage but as time advances and when the man becomes more and more familiar with his work, there will be no room for regret, as he will be producing marketable goods. I do not dwell upon the marketing of these goods as this very largely depends upon individual cases.

Period of apprenticeship should not exceed three years and they must be paid from after three or four months according to the interest they take in their work and the useful work turned out by them.

If the industrial school is of the type proposed above, the Director of Industries will be the man to have control as he will be the person who will know which craft requires attention and which not.

Employés of factories in night schools learn their 3 R's. which helps them to realise if they are properly paid and treated. In most cases the night school attendance is only diversion or pastime for the men employed in factories and for this reason alone night schools must be encouraged.

Year after year scholars are sent to Europe and America for studying industries with the idea that the young men after returning from abroad will be useful in promoting the particular industries in which they are trained. It stands to reason that these young men will be useful if not as first rate men as middlemen to carry on industries here. If these are unfit, the system can be abolished altogether with advantage to both the scholars and the Government. No doubt there are defects in the foreign scholarship system and it is desirable that this question is deeply considered as early as possible. It will be wise if the scholar sent to foreign countries has a tolerable grounding in the profession he takes up before he is sent abroad. He will be able to profit by such study, (1) as he would then have already acquired sufficient taste in his subject, (2) as he would be conversant with the limitation under which he must work in India, (3) as he would know where the difficulties occur and how they are overcome in a place where the industry is run on established lines, and (4) as he would be mature enough to realise his responsibility and gather ripe knowledge during his stay. Moreover his usefulness after he returns from abroad must be definitely settled before being sent out. If this is not done, there is no good in sending such men. In some cases they have to spend a number of years before they find a job they can accept and when they do, they have half forgotten the subject. These are points I have raised with the idea that the Commission will have to give its opinion about the present prevalent system adopted by Government for encouraging industries in India.

In my opinion it will be desirable if Government would address the industrial concerns of the Presidency if they propose to recommend applications from their firms with a view to qualify their present managers or supervisors for studying the conditions and methods in other countries which will improve their knowledge. It will be the duty of Government to choose from among these, the men they think would satisfy for promoting a particular industry. These men should not be above 45 nor below 30.

For industries assisted by Government in a direct manner, the technical man concerned should be given the opportunity of studying foreign methods to broaden his views and modify his methods wherever he is blundering.

Official organisation.

Q. 56.—This is dealt with under Q. 63.

Q. 57.—(1) Briefly told, the organisation required for the local Department of Industries will be proper technical and trade schools wherein skilled labourers and foremen can be trained. There are some under proposals, and these when completed will meet the requirements in a way.

(2) Proper technical or scientific laboratory and staff for research work when occasion arises.

(3) Proper staff required for experiments taken in hand.

(4) Organisation to investigate the condition of existing cottage industries and the opportunities for creating new ones.

Qs. 58-60.—An Advisory Board would be unnecessary if there is an able and sympathetic Director who will have a free administrative hand. A Director is necessary and before he takes up the place he must be conversant with the conditions of the Province and its peoples. He must be capable of acting on his independent views and have administrative ability.

A business man is unnecessary as the department must not concern itself with business though it should conform to the ideas of business men. A business man carries with him the traditions of business and in the Department of Industries which has quite a different function to discharge, he will be out of place. An expert again is of no use unless the department is concerned with a group of correlated industries so long as he continues in office. To my mind the best man for the place will be a non-expert official having adequate administrative experience.

Q. 62.—The various provincial departments may be linked with an Imperial Department under a single head. An Imperial Department is necessary and will be useful in keeping a friendly eye on the activities of the various provinces in [illegible] down unhealthy competition as regards industries, in avoiding unnecessary overlapping by different provinces, and in giving lines of work for the several provinces having regard to the supply of materials, labour and market. The Imperial Department will be purely administrative.

Technical and scientific departments.

Q. 63.—Without going much into the past history of the departments, I may say that there are at present two departments, one under the control of the Director of Agriculture and the other under the Director of Industries which are directly concerned with industries.

The former department concerns itself with matters relating to the agricultural industry and there is an Agricultural Engineer with an Assistant Engineer for administrative work besides about a dozen district supervisors who are partly lent by the Public Works Department and partly mechanics trained in the mechanical engineering schools. I have worked in the earlier period of my service as a district supervisor and my experience tells me that a supervisor in charge of the districts (under the Agricultural Engineer) must have good character and sound technical qualifications, if the work under his charge should increase and be at the same time efficient. The supervisors have to install agricultural plants for ryots and a good deal of tact and intelligence is necessary to bring into existence profitable concerns and reject unhealthy enterprises. The local Public Works Department can supply, if they mind, the right sort of men in case such men would be adequately paid. The amount or quantity of district staff can be considerably diminished by placing these men and the total charge for the Government would be the same with much better results in the latter case.

The Department of Industries concerns itself with all industrial matters and industrial education. The present work and staff of this department is as follows:—There is a Leather Trades School which includes in its staff besides a Leather Expert or Principal (who is at present on military duty and whose place is filled up for the time being by an Indian who has studied the leather industry in England after a preliminary career in a local tannery) lecturers on chemistry, book-keeping, etc. The aim of the school is to train the sons of practical tanners in the advanced and scientific methods of leather manufacture. The school has just been started and it remains to be seen how the men interested in the industry are going to avail themselves of an institution of this kind. The leather industry is one of the chief industries of this Presidency and Government has done all it can to foster it. There is a weaving department consisting of two superintendents having for their duties the imparting of instruction among the weaver class about the advanced methods of weaving with fly shuttle looms and advising generally on weaving as a cottage industry. A dyeing expert has been working at Madras for the last five years. His regular work, owing to the delay in the construction of the technical institute at Madura, the chief dyeing centre of the Presidency, has not commenced. In the meantime he has dealt with the question of indigenous dyestuffs. He has been also put in charge of various special functions—preparing a syllabus for industrial schools, the Principalship of the Leather Trades school, technical advice to the Punalur Paper Mills and the Madras Pencil Factory. His services are at present availed of in the general directions indicated above and he will probably take up his duties at Madura as soon as the building is completed. Analogous to the commercial museum of Calcutta, the department has organised a bureau of industrial information. The bureau is in charge of a superintendent and is intended to help enquirers on commercial and industrial matters. Including the Director the above forms more or less the present permanent staff of the department.

The department has taken in hand the following problems which are of temporary interest:—(1) fire bricks, (2) oils, (3) pencils, (4) paper and (5) glass. (1) and (2) are in charge of the Assistant Director who is a temporary hand in the department. (3) where I am working is at present in charge of the dyeing expert, (4) is in charge of an engineer, and (5) is in charge of a sub-engineer of the Public Works Department. These concerns will be of a temporary nature and when their industrial aspects have been fully gone into, the case will arise whether or not successful private concerns can be started on the basis of the experiments conducted by the department. In these experimental factories there are two Public Works Department men of the permanent upper subordinate establishment, Mr. Narayanamurthy on glass and myself on pencils. These are again only temporary so far as this department is concerned. The services of others are more or less of a temporary nature.

The department is discharging another function. There are a few industrial schools scattered all over the Presidency having for their aims the teaching of artisans in their crafts. These schools are aided by Government through the department. Apart from these aided institutions the Government technical institute at Madura has been for the last few years training young men for oil engine driving and general fitting work. These are schemes afoot for amplifying the usefulness of this institute (mechanical engineering) and for including weaving and dyeing also. There are schemes to be given effect to in the City of Madras for trade and technical schools with a view to meet the demand for men trained in their profession.

As I am in no way connected with the administration of the department but ye one of the departmental staff I do not wish to express any views on the individua activities of the department and moreover as the Commission would otherwise obtai opinions on these it is unnecessary for me to mention mine. However, I raise a few general points on general working of the department—

(1) It is desirable that the department should concern itself with a *limited* group of related industries which will enable them to work efficiently in the light of the knowledge and information gained. In dealing with any industry, there must be several issues to solve and in dealing with a group of correlated industries there will be several common issues and their solution will considerably lighten the work in later enterprises. The natural resources of the locality and the conditions of the labour and market will dictate in favour of some and against others and so a definite programme can be fixed.

(2) The man engaged by the Government on industrial experiments must have no lien on Government service and must be such as would willingly go with a private concern when the Government have made up a case for private management. This is one of the essential elements for success of any industry here. For all industries three class of men are required—(1) high grade scientists, (2) middlemen (supervisors or managers) and (3) labourers. As regards high grade scientists, they are worth any money provided proper use is made of them. Their work will be more or less of a leisurely kind so far as the industry is concerned. We have a number of them all over the Presidency. As regards middlemen they must be made out of the right sort as they do not exist. There will be difficulty in making them as the right sort of men for industries find lucrative posts elsewhere under Government or become lawyers and doctors. It must therefore be one of the fundamental duties of the Department of Industries to produce alongside of any experimental factory two or three men capable of handling such industrial concerns. There is no good in promoting industries with no provision for management. (Vide Ans. Q. 67-70).

(3) In the department itself, apart from the middelmen that are seen along with the industry when it matures there must be someone conversant with the industry so that he may be in a position to render initial advice when the department takes in hand a cognate enterprise. But if the department has made up its mind not to touch any of the allied industries, there need not be any vestige of its past activities excepting the reports and results. So then the department need not have any permanent staff on industrial experiment. Young engineers of the local College of Engineering can be attracted to such posts as has been done hitherto. But it is open for these men to find comfortable berths in the Public Works Department, Local Boards and Municipalities, where the work will be comparatively light and less taxing. Men capable of assimilating ideas and taking the initiative are what is wanted for industries and I am unable to touch upon any other resource for the class of men required for industries.

(4) Industries generally can be classed as major and minor. By 'minor industries' is meant all those that do not require erection of plant and machinery and that can be pursued as cottage industries. The best organisation that is required in this case is an organisation to supply the workers with raw material and receive back the finished products at reasonable prices. It is true that there are not many organised cottage industries though India has been, from time immemorial, noted for its excellent cottage industries. It is very often pointed out in the press that cottage industries should be revived. In modern times, it is doubtful if cottage industries will pay in all cases. The Department of Industries may examine individually every cottage industry in select places and advise if there is any ground for perpetuating a cottage industry in spite of the competition offered by modern machinery. My presumption is that it will be no longer possible for cottage industries to hold their own.

However it may be worth investigating a little deeply to have a clear view about it. Except weaving the Department of Industries does not concern itself at present with cottage industries. Here again there are so many kinds, one kind of weaving may pay; another may not. Surely anybody will look to the Director to give an opinion as regards the commercial aspect of cottage industries as practised at present and if there is any scope to improve. All the industries which require erection of large plant and machinery and controlling a fairly large amount of labour are "major" industries. The "major" industries require large capital investment while "minor" industries do not. All that is required in the latter is a strong local organisation in successful cottage industries to prevent them from dying out. It is possible that some "minor" industries suffer for want of this organisation and the effort required is very small considering the benefit to be derived.

Qs. 67-70.—If experts are to be engaged for pioneering industries in India, there is no good in having second and third rate men. Men who will be called expert in Europe or America should be procured. Such experts should be paid a very high salary and will be worth it. But I doubt if such sort of men would be easily available for service in India. These men should possess practical knowledge that is derived by long connection with any established and successful industry at home. In many instances it must be impossible to tempt the proper men for service in India even on very high salaries considering the human side of the question. To obviate this practical difficulty I would suggest a course that has been pursued in Madras by Messrs. Chatterton and Tressler and with a certain amount of success. When any industry is started as an experiment the local Department of Industries concerned can assign it to a fairly educated young man who will take interest in his work and will be ready and resourceful to attack the various issues that will arise in handling a new industry with a certain amount of confidence and optimism. In doing so, the head of the department should be perfectly level headed and properly direct and control his work without permitting him to deviate from his field. In doing so, the various practical difficulties that spring up owing to the local conditions will get solved in a way and a practical basis for work can be established. The method of manufacture so established may vary in some particulars from what has been done elsewhere but the problem can be considered to have been solved so long as the industry promises to pay and so long as Government has done all it can. There is one peculiar benefit in this course. During the experimental stage, the man in charge becomes thoroughly conversant with all the processes and is familiar with all the aspects of the industry. The Government would not only have the thing solved but also have trained a staff to run the industry in an efficient manner. On the contrary if a good and willing foreign expert was employed the trouble will come in as to what should be the future of the industry when he goes away. To instance a practical case, the glass factory at Madras engaged two German experts who, so long as they were there, were producing very good glass but after they had left, nobody could do that. So then it should be considered before experts are appointed as to the precise condition of the industry when experts appointed on very high salaries sever their connection.

It will be unnecessary to hold a special whole-time expert for any industry at the cost of the Government as there will be no opportunity for such a man in India. When the time comes for it, this can be very well met at the cost of the concerns which will profit by it. If there is an Imperial expert staff a point for criticism will arise from the industrial and commercial public that the Imperial expert staff is not equipped in all directions, and it will be a waste to engage, at present, a huge staff to cover all possible grounds. If there is no expert on glass, but only on paper, the glass traders have room for complaining that the Government are benefiting only paper trading. The paper expert again cannot be doing useful work unless Government proposes to attach him entirely to a factory for a considerable period or better still his full capacity for service. And it is quite open to a factory to choose its own expert and Government aid will be unnecessary. But if he is not so engaged, his usefulness in his own country is marred with no compensating advantage here.

To obviate these difficulties if the local Governments can have one or more laboratories or institutions manned by scientists who will be able to help in a suitable manner the men who resort to such laboratories for doing research work, it will be easy for the local Department of Industries to command the convenience it requires to conduct small researches. In such laboratories, it will be impossible to include specialists unless the local Governments concerned pins itself to a group of co-related subjects which may take a very long period to complete. Otherwise it will suffice if one or two pure scientists are employed. The local Director of Industries must have complete control of this laboratory. This system will more or less meet the immediate local requirements in a workable way. In course of time, such a laboratory can grow into increasing importance not on account of the initial establishment or equipment but purely from the amount and nature of work done at such a laboratory. Proper arrangements may be made for recording and publishing the useful work done at such a laboratory. Such a laboratory can be constructed as exigencies demand and grow as time advances; it may ultimately develop into a technological institute.

Technological institutions.

Q. 71.—I do not see that there is any present need for technological institutions at Madras and when the case arises for one development may be made in the directions required. On the contrary if technological institutions are developed before the industries that will be profited by them are brought into existence the institution may be subsequently found to be unworkable. When the proper case for it arises, it may arise in a place where its necessity is keenly felt and will be of an abiding nature. Such technological institutions, as they arise, may be part of a general scheme for the whole of India.

Q. 72.—It follows from the above that such an institute would work efficiently only when it deals with a limited group of correlated subjects.

Q. 73.—Government initiative will be necessary and sufficient and control unnecessary. In my reply to Qs. 67-70 I have indicated the outline for a laboratory and a technological institute may be developed out of this groundwork.

Co-ordination of research.

Q. 74.—There will not be much overlapping in the circumstances stated above and if there is, it will be unavoidable and there will be no harm in it.

Qs. 75-76.—The Science Congress will become useful if it takes interest in industrial matters that are being gone into by Government or private firms in India.

Q. 77.—To render the method suggested in my reply to Q. 67-76 useful, the man trained locally who cannot be called an expert, should be sent abroad on deputation for at least a short period to improve his knowledge. Before he is sent out arrangement must be made to enable him to visit the foreign industrial concerns which will improve his existing knowledge about his industry. In many instances it will be difficult to have full access owing to jealousy which is just and reasonable but yet it will be possible to enlarge his knowledge considerably.

In sending out such a man, the Government should bear all his charges till his return in addition to his ordinary pay. Arrangement can be made by the Secretary of State as is at present done for State technical scholars while away from India.

Reference libraries.

Qs. 78-79.—I have found difficulty in obtaining books of reference on technical and scientific subjects and there is not a proper library in Madras. It is desirable that the Director of Industries should own a complete library wherein recent editions on technical and scientific subjects are available for reference. In such a library books dealing with pure science need not come in as they will be available in other colleges and public libraries.

Commercial intelligence.

Qs. 82-83.—Very useful information is available from the publications of the Departments of Statistics and Commercial Intelligence. If it is possible to locate the consumption of foreign imports and prepare statistics of local production with particulars, the information will give a full idea of local requirements and how they are met. Similarly in the case of our exports, we shall learn where we are to look for a ready sale. Such information is available from the report on rail and sea borne trade but it will be admitted that the publication is wanting in description of details and full particulars of the imports, exports, and consumption. These journals may give fuller particulars having regard to the fact that there is a good organisation to collect and publish.

Q. 85.—If Government should establish or assist industrial journals either for general or special industries, it would not be of much use to persons actively engaged unless Government had had opportunities of practically testing and verifying statements made therein and unless Government *aims* at thoroughness. To instance a practical case, several species of timber were given out to our pencil factory as being likely for pencil making and some of them were found to be good enough in trying a sample piece; but when dealing with bulk samples, most of these had to be discarded. There are various considerations that will be looked into by an industrialist and if these have not been *fully* entered into the publication will be incomplete. So, in order that the industrial journals may help the industrialists, it is desirable to restrict the scope of the journal for particular industries in which the Government can confidently hope to supply good and useful information for the time being.

Q. 86.—I do not think that dissemination of industrial information, in the various vernaculars will at all serve any useful purpose and I am of opinion that beyond serving as an advertisement for the departmental activities, the additional benefits derived will be altogether disproportionate. Dissemination of information in various vernaculars on agricultural matters will perhaps be of value among the agricultural public who may not be able to read the English language but such a step as regards industrial matters is of doubtful utility.

Q. 87.—Special monographs on industrial subjects, as has been already pointed out against Q. 85, should have combined authorship—combining in them, theoretical and practical knowledge. Even good monographs beyond giving rough outlines will not materially help an industrialist whose conditions cannot, in most cases, be foreseen or realised by monographists. The circumstances that will vitiate the usefulness of these monographs are want of thoroughness in the monographs themselves, and the varying conditions of labour, material machinery and market. Any monograph has got an educative value and it is desirable that Government should encourage publication of *useful* monographs by men who can be looked upon as competent men to deal with the subject. Care will have to be exercised that no unsound advice is given or unnecessary or incomplete publication is permitted. The monographs should aim at completeness on the following heads: (1) technical knowledge, (2) materials, and (3) commercial aspect of raw materials and finished products.

Q. 88.—There must exist useful monographs in other European languages and English translations of the useful ones will perhaps in some cases save a certain amount of spade work. Their usefulness will of course be of a limited nature and so, with proper judgment, sound and really valuable publications can be made accessible to the English reading public.

It is a very deplorable state of things for the manufacturer and consumer that there is often a variation of 100 per cent in prices at the two extremes. This very wide variation in many instances handicaps domestic industries. When an article is manufactured in Germany for one anna and costs the consumer in India annas two there are various intermediary agencies and middlemen whose interests in perpetuating established imports from abroad offer a permanent check to any new enterprise. It will be very difficult for Government to remove this difficulty but yet it would have discharged its portion if comparative calculation be published which will serve as a guidance for the manufacturer or trader as to how far he can take any permanent foothold in the [illegible] without fear of loss.

Certificates of quality, etc.

Qs. 89 *to* 92.—Articles of consumption such as oils, drugs, chemicals, and soaps wherein adulteration is possible or impurities may exist should be certified as regards the extent of purity. Articles of food that will affect the consumer's health should be penalised and others which carry harmless adulterants should be warned off.

Collectors of the districts or the Local Government alone should be competent to grant certificates. They alone can competently deal with the inspecting staff who will pass goods for consumption.

Railway freights.

Q. 98.—I cannot say I have got any complaint as regards railway freights as I have not yet come across any difficulties till now. But yet I may point out that the freight charges on wood for industrial purposes may be on a line with the ruling rates for fuel. There is reason for this. The cost of wood in both these cases is more or less the same, probably less in the case of wood for industrial purposes as these have no market locally and as additional freight will increase the revenue of the railway companies.

Pencil industry Madras.

Q. 110.—(1) I am connected with the pencil factory and my first point is about wood supply. This is one of the factors in determining the success of the industry. I cannot say that investigation as regards the proper Madras wood is yet fully settled though some are found to be suitable in a way. The difficulty so far felt comes in obtaining it in proper condition and time. I feel that this will be solved satisfactorily in course of time. In the interest of the industry I would suggest that to any private company that starts the enterprise Government should supply with suitable forest timber free of seigniorage for say five years and thereafter undertake not to charge anything above that done for cheapest timber. This concession need not be extended in favour of high class wood and I do not think that any high class timber is available for superior grade pencils. Similar concession should be granted for graphite mining.

(2) Considering that Government departments require large quantities for their use in the various Provinces of India and that Government have control of the forests wherefrom timber for manufacture has to be derived on a commercial scale, it may be a proposition for the Imperial Government to set up one Government factory which will cater purely for all the departments of Government in India.

(3) A study of the methods adopted in Ceylon to refine graphite must be made from a purely practical point of view. On making this study it must be seen if we can do refining with better advantage.

(4) Considering that the industry is a complicated one, though to a casual observer it is simple, it is desirable that the Government should keep in view that the research work in connection with the industry is yet incomplete and should be carried on for some more time if the industry is to be based on sound commercial lines. I may suggest that even though the industry is handed over to private management in the near future Government should see that the investigations pending are not ignored.

(5) Considering the importance of labour in the industry Government should so arrange matters when handing over to private management that the existing organisation of skilled labour is fully availed of.

Q. 111.—In having had to deal with pencil manufacture, I had to know something of clays and having regard to the existence of China clay all over the Presidency it seems to be a likely problem for Madras to investigate the possibilities of a domestic pottery industry. I am not thoroughly familiar with all the resources though I know of some and, if a systematic investigation as regards quantity and quality leads to the erection of a few factories, much of the imported porcelain goods can be cheaply manufactured here. The potters of the Presidency are not familiar with the processes in making high class pottery and owing to the fact that the Government of Madras have in hand two important industries in pencil and glass, they are in a very advantageous position to take ceramics as their another likely subject. Methods of manufacture and raw materials being in most cases similar, investigations made as regards pencil and glass will be helpful.

Qs. 112 *and* 113.—Cheap woods for industrial purposes is available in large quantities in the forests of the Presidency but for want of transport facilities and proper technical knowledge to deal with them their use in making pulp, paper, charcoal and several valuable commercial organic compounds is not made. I doubt if there is any definite statistical information as regards quality, quantity and costs of assembling the produce of the forests with reference to the above industries. The produce of the forests is not, to my knowledge availed of in these directions, primarily for want of expert knowledge and partly for lack of reliable statistical information necessary for any industrial undertaking. It however may be generally presumed that the transit charges are prohibitive as the railways except in a few places, do not pierce through the forests. Considering the large forest area, the staff at present employed for the administration of forests can hardly cope with the work they have in hand and it is impossible for the Forest Departments to do anything more than what they are doing at present unless additional staff is created. It will be up to this additional staff to lay proper roads inside the forest with reference to the produce to be exploited and to systematically investigate the forest products.

Note.—*Witness did not give oral evidence.*

Witness No. 218.

Mr. N. Subrahmanya Ayyar, *Weaving Assistant, Department of Industries, Madras.*

Written Evidence.

Capital.

Qs. 1 *to* 3.—My experience in this direction is limited to one or two small enterprises. In the year 1908-09 a few gentlemen of Salem formed themselves into a syndicate and had almost completed negotiations for taking over from the now defunct Government weaving factory, the shawl industry that was demonstrated beyond doubt to be commercially successful. The required capital was readily forthcoming, but before the business could be taken over, the syndicate insisted that, in order that the same satisfactory results might ensue after the transfer of the business, the Superintendent of the factory should continue his supervision for a sufficiently long period. To ensure his taking sufficient and genuine interest in his work, the syndicate thought that he should be asked to invest some of his own money in the business and that he should be allowed to accept extra remuneration. As these conditions could not be fulfilled the scheme fell through. It seems to me that for establishing small industries, the capital required can be easily had, provided the scheme has been shown to be sound and has secured confidence, and provided also that skilled supervision is available. The promoter of the scheme will however be expected to show his faith in it by himself sinking some of his own money in the proposed concern.

A company was also formed in Madras about the year 1905 called the "Madras Chrome Leather Company" to manufacture chrome leather and chrome leather goods. To my knowledge they found no difficulty in securing adequate capital, though the concern collapsed on account of other causes.

I am not familiar with the details of any large enterprises, but I venture to think that if Government should help an enterprise in some way, after satisfying themselves as to the soundness of the scheme, there would be no difficulty in Indian capital being secured.

Industrial enterprises are confined to towns or the vicinities of towns. The capital for large enterprises is generally foreign capital. The Indian capital for industrial enterprises comes mostly if not entirely from townspeople. The absence of capital from people in villages is in my opinion due more to the poverty of the population than to lack of opportunities, ignorance or want of enterprising spirit. In order that the benefits of industrial enterprises may reach villages, long-term advances should be made to poor villagers by co-operative banks started for the purpose. In all industries encouraged by Government, there must be proper supervision by them and the industries must be run on the principle that the profits pertaining to them should be shared by the workmen also.

Government assistance.

Q. 5.—Generally speaking, the form of Government help depends on the merits of each case. In large enterprises, I am inclined to think, that the provision by Government of part of the share capital of companies on the same basis as public subscriptions of capital and guaranteed Government purchase of products are the most effective. In cottage industries like the weaving industry, money grants for the purchase of improved appliances or the supply of such appliances on easy terms of payment of cost are preferable to other methods of help. Bounties and subsidies may not, in my opinoin, be conducive to the rapid growth of an industry. Loans may be granted but not without interest except in special cases. Guaranteed dividends for a limited period and supply of machinery and plant on the hire purchase system are also useful in the case of small industries. But when an industry is such that it has to combat the powerful competition of a well-established foreign import trade, all possible methods of help should be made available, and no limitations should be placed on Government aid when a new enterprise is intended to keep out foreign manufactures.

Whatever may be the method of help rendered by Government, I think it is essential that Government should have a general control over the accounts connected with the business. It is not desirable for Government to interfere with the actual management of the business; but where Government have taken shares, there may be a Government director on the directorate whose powers should be the same as those of other directors.

Pioneer factories.

Q. 7.—My experience of the aluminium and chrome leather industries started by Government leads me to think that Government should pioneer new industries. After consultation with technical experts, and on data carefully collected the Government should embark on such industries as promise to be commercially successful. After the enterprise has been demonstrated to be successful it should be handed over to private capitalists or companies. Conversion of successful pioneering experiments into permanent enterprise is not at all desirable.

Co-operative societies.

Qs. 11 *and* 12.—Except a small society formed at Mambalam for oil pressing and the Co-operative Weavers' Union at Conjeeveram, I have not known any industrial co-operative societies.

In my opinion, almost every industry can be benefited by co-operative societies. For every industry, there ought to be societies for finance, for the purchase of raw materials and for the sale of finished products. Co-operation among weavers is an immediate want, and in my opinion, it is the only means of uplifting the present condition of the indigent weavers and of transferring to them the profits now taken away by middlemen. The organization of weavers' societies should, under the present conditions of the community, include besides weavers, other persons that understand business.

Technical aid.

Q. 15.—Besides my experience of the aluminium and chrome tanning industries I have had intimate acquaintance with the handloom industry of the Province for nearly 15 years. The weaving industry has been considerably benefited by the investigations of the Weaving Department of the local Government. All over the Presidency, improved slays have been introduced, and in some of the coast districts north of Madras, the fly shuttle has come to stay displacing the country loom altogether. To a smaller extent, country-made dobbies have also come into use. The introduction of the improved slay has improved the economic condition of the weaving community, the earning power of the fly shuttle weaver having increased by about 33 per cent. The beneficial influences of the results of investigation by the Madras Government have outgrown this province and have spread to other Presidencies.

The loan of Government experts to private firms or companies should not be free except it be to help infant industries. In my opinion no restrictions should be placed in the matter of the publication of the results of researches made by a Government paid expert while attached to a private business, but the party should be apprised of this condition beforehand.

Demonstration factories.

Q. 19.—Peripatetic demonstration factories similar to the peripatetic weaving parties now working in the Presidency are, in my opinion, highly useful in the case of cottage industries, while central demonstration factories are necessary in the case of large industries.

Industrial surveys.

Q. 25.—The existing knowledge of the available resources of the country—agricultural, etc.,—should be supplemented by further surveys. The survey should consist of one or two officers belonging to the department concerned who are familiar with the country and a few men actually engaged in the business. It should be considered whether the materials collected during the survey would be helpful in developing an industry. On doubtful points, the opinion of experts should be taken.

Exhibitions and sale agencies.

Qs. 30 *to* 32.—Industrial exhibitions are primarily intended to serve (1) as effective sale agencies and (2) as agencies for educating the public more especially the artisan classes.

The present day exhibitions of which I have had some considerable experience, do not in my opinion fulfil either of the two objects satisfactorily. The enormous expenditure incurred in connection with these exhibitions is out of all proportion to the results that are ordinarily obtainable.

Of the value of exhibitions as the medium for sales I do not think much. I have heard constant complaints from merchants that the business they are able to do at the exhibition is so very small and the risk they have to undergo is so heavy that one rarely thinks of repeating his visits. The highest ambition of a merchant is to obtain a medal for his goods for the sake of advertisement and having obtained it he no longer thinks of that exhibition.

It seems to me that commercial emporia at convenient district centres will be a much cheaper and more effective method of disposing of products. Emporia for all kinds of goods at district centres and one for high class goods from all over the Presidency in the Presidency town, will serve as efficient sale agencies. The weekly fairs held in certain districts such as Coimbatore are practically commercial emporia and if such fairs should be better organized and kept under the management of Municipalities or Local Boards they would answer the purpose admirably. Co-operative distributive societies such as the Triplicane Co-operative Stores will be another effective means of disposal of finished goods. In this case, the consumer and the producer are in an advantageous situation. The producer has the advantage of selling his goods for ready money without much intervention from the middlemen, and the consumer for whose benefit the society exists has the certainty of getting a good article for the price offered.

As regards the second object of exhibitions, viz., the education of the craftsmen and the consequent improvement of the crafts, exhibitions as conducted at present are of little avail. No real workers attend the exhibition, poverty and other causes prevent them from leaving their homes for distant places, and no serious attempts are made to persuade the men with monetary help to attend the exhibition. In my opinion, an exhibition without visitors from among the artisan communities fails in its purpose. It is the craftsmen that can obtain the maximum benefit accruing from exhibitions. A number of articles of the same description but of varying degrees of workmanship are presented for comparison so that people in the respective lines of business may take notes and try to emulate their more skilled brethren. Such advantages of exhibitions are now denied to the real workmen. There is no doubt that exhibitions conducted on right lines will have considerable educative value. Annual exhibitions are unnecessary and they may be held once in five years or so.

Speaking of cottage industries, I should think that in the present ignorant condition of almost every class of artisans, a sort of itinerant exhibition will be productive of greater good than one held in any fixed locality.

The exhibition should contain three different branches, one for the indigenous products of the province, one for those of other provinces of the country and one for similar articles of foreign make. All exhibits should bear labels showing their cost and the places of their manufacture. Such shows serve to acquaint the men engaged in industries with what is being done in other provinces and in other countries.

Trade representatives.

Qs. 34 *to* 36.—Inter-provincial trade representatives are essential for various reasons: the chief among them are (1) that they can help in arranging for the right sort of exhibits at exhibitions, (2) that they can in time acquaint their own province with market prices of articles in other provinces and (3) that they can exploit new markets for the products of their own province. It often happens that when other provinces such as Bombay or Bengal want a Madras product usually exported to foreign countries, owing to absence of an organization or recognized representatives who can help in a regular interchange of accurate market news, the sudden outside demand unsettles the local market and makes it unsteady for a long time.

Trade representative should be chosen from among men who are themselves directly concerned in the manufacture of Indian products. Chambers of Commerce and trade unions or guilds should be able to supply such men, but unfortunately such organizations are rare in our province. Trade unions at convenient centres are a real want.

For the reasons above set forth, trade representatives in foreign countries are equally essential or even more so. The trade representatives should possess complete knowledge of the conditions of labour, market, and other requisites connected with a business, which obtain in India, and with that knowledge he should proceed to study the resources and markets in other countries and be of use in effectively guiding India in manufacturing and marketing suitable articles. Such people, it need hardly be said, considerably help in the country ascertaining the market prices of foreign articles, raw and manufactured, used in this land. In short, these representatives will be useful in several ways in developing the trade and industry of the country.

Government patronage.

Q. 37.—Government departments which use imported articles should publish lists of those articles with prices freight and other charges being noted separately—and also exhibit them at commercial emporia, museums or exhibitions.

Banking facilities.

Q. 39.—More banking facilities than are at present available should be afforded for the marketing of indigenous products, more especially where the markets for such products are foreign. Take ground-nuts for instance; without a bank's help no business in that product is possible. Until a year or two ago, it would appear that certain banks in Madras and Pondicherry used to pay advances on goods warehoused with them. At the present time, they do not advance money on the mere security of goods kept in their custody but wait till they have received from foreign banks advices of contracts. The banking facilities at present available seem moreover to favour only big firms that export goods direct. Smaller merchants and ryots who are producers have got to look to Nattukkottai Chettis, who getting money from the abovesaid banks lend the producers at much higher rates of interest. Any profit that the ryot may get by the sale of his product is often swallowed up by the heavy interest that he has to pay on the loan taken. Improvements in the present banking arrangements must therefore be in the direction of helping smaller merchants and ryots.

Existing banking agencies should have branches in important centres where articles for export are produced, in order that they may help the producers with advances of money in times of necessity on the security of goods stocked in their warehouses. It seems to me that co-operative banks will be most helpful in this respect, for on the security of stock on hand they can advance ryots and small merchants sufficient money and wait for repayment until the owner of the stock finds a favourable season for the sale of goods, subject to certain limitations regarding time. The existence of banks will enable the producer to avoid taking advances from the *trading firms direct as at present;* it will further help in the prevention of adulteration of goods, because it will be the interest of banks to ensure the quality of goods before payment of advances. If arrangements can be made for ordinary banks that now finance Nattukkottai Chettis and other money-lenders to divert their available sources to lending co-operative banks, or if in any other way, the co-operative banks that may be started for the purpose are financed, brighter days will have dawned for the ryots and small merchants.

This system of financing will, I am sure, go far to improve the present wretched condition of the ordinary working weaver who, in order to find the money for the day's food, has not infrequently to sell his manufactures at below the cost price. It must be the interest of Government to see that every able-bodied person gets work in the country and gets also adequate wages for his work.

Training of lab

Q. 44.—In the weaving industry of the province with which I am familiar, the Government's efforts to improve the condition of the hand-loom industry began with the establishment, in the year 1901-02, of a small experimental workshop in the School of Arts. With the removal of the plant to Salem in the year 1906, this was developed into a factory, and the factory was working successfully till about the beginning of the year 1911 when it had to be abolished owing to Lord Morley's despatch. In 1913, an instructional weaving party was organized whose duty was to visit important weaving centres in the Presidency with improved appliances and acquaint the weavers with the advantages of those appliances. Whatever the methods adopted by Government, the object in general has been to introduce improved methods and appliances among the weaving community; this introduction has no doubt resulted in improving the labourer's efficiency generally. Special mention must be made in this connection of my experience of the work in the Salem factory of which I was Superintendent. It was the aim of the factory not merely to improve the labourer's efficiency and skill, but also to improve his moral character. On account of poverty perhaps, the morality of the average weaver is of a very low standard. The honest efforts that I made in these directions were attended with disappointing results, and on a careful scrutiny, I found that various causes had contributed towards this poor result. Only the waifs and strays of the community sought admission into the factory, while the better class of weavers who could earn their living were not attracted to it, firstly because, factory life is uncongenial to the weaver unaccustomed to regular habits but accustomed to work at capricious intervals, and secondly because he is a man without ambition. Those that joined the factory were, as expected, hopelessly incorrigible.

My intimate acquaintance with weavers leads me to think that the first step to be taken to improve their efficiency is to create in them a spirit of ambition, a liking for better life and greater comforts. The weaver must realize the dignity of labour and understand the value of time. Until he reaches that stage, it will be difficult to bring home to his mind the advantages of improved methods and appliances.

Education in a large sense of the term is a condition precedent to his advancement. The educative value of exhibitions in these directions is of considerable importance and should be noted.

Factories are indeed a successful means of improving the labourer's efficiency and skill, and there the steps necessary to stimulate the men to do better and more efficient work such as the award of bonuses, extra wages, etc., are all possible. But as pointed out previously, the factory is unsuited to Indian conditions in general and to those of the weaver in particular.

In the case of the weaver, he must be redeemed from the bondage of the money-lender before any proposals can be entertained to improve his efficiency. I am inclined to think that co-operation is the only means of improving the condition of the weaver classes, in fact of all artisan classes. But co-operative societies among weavers are difficult of accomplishment under present conditions, when almost every working weaver is indebted to the money-lender and when therefore efforts to start societies are either actively opposed or viewed with disfavour by capitalists. Whatever the difficulties may be, some means should be devised to start a few pioneer societies. All the requisites for improving the efficiency of the weaver will result from co-operative associations. Co-operative credit will bring about thrift and all its concomitant moral advantages by combining saving with credit. It would teach self-help, self-discipline and prudence which the weaver miserably lacks. Co-operative purchase would result in the cheapness of articles combined with quality, and co-operative sales would relieve the individual weaver of the most difficult portion of his work, viz., the disposal of his product, and leave him free to attend to his maufacturing work.

In the initial stages of co-operative organizations for weavers, outside help is indispensable, especially where the business and technical sides are concerned.

Industrial and technical schools

Q. 47.—Industrial schools have trained a certain number of men in the use of improved appliances and have made them available for service under private employers. In industrial schools, only the principles of working new appliances are taught. Factories generally are essential to supplement the course of training in schools. Only in factories can the business or trade-side of an industry be learnt satisfactorily, and for this purpose the factory may be owned by private bodies or may be attached to technical or central industrial schools. In other words, the school and the factory must always go together.

I append a separate note on the system of education to be given to weaver boys in industrial schools and on the training to be given to master weavers and to supervisors in technological schools.

Q. 59.—Industrial schools proper should be under the control of the Department of Industries. As the general education imparted in such schools should be of a special character so as to be useful to the craftsmen in their vocation, and as they need not necessarily conform to the rules of the Educational Code, the control of the Education Department would appear to be unnecessary. The craftsmen ordinarily do not pursue their education after a certain stage and the education that they receive in an industrial school is not, as in the case of ordinary boys, a stage in the ordinary course of general education.

Official organisation.

Q. 56.—There should be a Director of Industries with a Board of Advice. The Board should have no executive powers. It should consist of from 12 to 20 members half of whom should represent the industries and businesses in the districts. The Director of Industries should ordinarily abide by the advice of the majority of the Board, and should any difference arise between the Director and the Board in matters of importance the case should be referred to Government for final decision. The Director of Industries should be a man of business.

Q. 62.—The results of the investigations and researches of one province should be made available for comparison with those of other provinces. I do not think that an Imperial Department is at all necessary.

Local Governments should have their own experts for industries such as the manufacture of coal tar dyes, drugs, scents, essences for aerated waters; silk culture and the like; mathematical instruments, etc.

The experts should work under the Director of Industries and should generally be engaged for limited periods only. In cases where for special reasons the experts require to be permanently retained, it should be made a condition before confirmation that the expert should have actually demonstrated the commercial possibilities of the industry.

Technological research institutes should not be allowed to develop as independent units but should be fitted into a general development scheme for the whole of India.

As specialization is essential for the growth and progress of industries, only groups of related subjects should receive attention at technological schools.

Courses of study in science subjects in Indian colleges should not be restricted to general principles alone but should extend to the practical application of those principles in the manufacture of marketable products such as soaps, candles, etc. In any demonstration factory that may be started by Government the professors engaged in making experiments connected with an industry should give practical demonstration of the commercial possibilities of the industry concerned. If this proposal should be carried out two research institutes would be ample for the whole of India.

[illegible] of foreign methods.

Q. 77.—Government experts should be given leave and special allowances to study developments in industries in other countries, but the payment of such allowances should be deferred until after the usefulness and profitableness of the special studies have been tested. The help to supervisors, managers and technical experts of private firms should be in the direction of affording facilities for study, such as arrangements with well-known workshops and factories for their admitting the experts, etc., and giving them all help.

[illegible] and trade journals.

Q. 84.—Government should assist industrial and trade journals which would be of real use to persons actually engaged in industries. Translations into vernaculars of useful portions of the journal should be arranged for the use of those engaged in the industry that do not possess a knowledge of English.

Q. 87.—Monographs on special industries, especially in the vernacular languages, are really useful, but the information embodied in them should have been obtained first hand. Every statement, opinion or view expressed by the compiler of every monograph should be based on actual facts and figures. These monographs should be revised once in five or ten years as may be found convenient, in order that they may be of real help in organising or improving industries. Monographs written on the strength of reports from District Officers are not of much value.

Certificates of [illegible]

Q. 89.—Speaking of textile fabrics, it must be said that a distinct decline has been perceptible in the quality of Indian manufactures for some time past. On account of various causes for which he alone cannot be held responsible, the average weaver often has recourse to uncommercial practices which threaten to ruin the national credit in the industries concerned. No industry will improve that does not pay attention to the quality of materials used and of workmanship. The use of one or the other of the several varieties of modern substitutes for genuine silk in place of the latter, the use of inferior metallic threads as if they are of the right quality, the faulty workmanship with the several devices to cover up the defects, are common features of modern day manufactures. If the present practice were allowed to continue unchecked, sooner or later the ruin of the several branches of the weaving industry is inevitable. The present deplorable condition of the carpet industry is an illustration in point. A system of hall-marking goods may effectively check the evil.

There can be no better agency to undertake this work than the caste panchayats that may still be found amongst every class of weavers; but they would require expert supervision. At the present time, such institutions are unfortunately used only for settling social disputes among the members of the community. But with organised efforts such panchayats might be made useful agencies for reforms connected with their calling.

Misdescription.

Q. 93.—Silk and woollen goods deserve particular mention as being cases where misdescription is most common. It is not only Indian manufactures that are misdescribed but more often foreign manufactures, and the credulous public have no means of ascertaining where the deception is practised. A few actions of law will perhaps be wholesome in checking deceitful practices, and I am told that the silk association of Great Britain and Ireland had to take such a step to restrain the misuse of the word silk.

Jail competition

Q. 109.—Jails can, in my opinion, do a certain amount of good towards developing the industries they are engaged in, provided they do not undersell their products. With favourable labour conditions, jails could manage to manufacture goods of the highest quality which would serve as samples for private persons to copy. I think that the central jail at Vellore has already done some good service to the cause of carpet weaving and is capable of doing even greater good. It might not perhaps be wrong to state that but for certain jails in India the carpet industry would have been in a much worse condition.

General weavin

Q. 110.—As regards the weaving industry in which I have been actively engaged, I have in previous paragraphs suggested certain lines on which the industry should be developed. I have laid special stress on the need for the education of weavers and the necessity for co-operative societies among them as powerful means of improving their efficiency.

With regard to improved appliances in weaving, a careful examination of the comparative merits of the different types of looms hitherto placed on the market has revealed the fact that the fly shuttle loom that has been adopted by us is the best all round. For pattern work, the Jacquard machine has been found eminently suited, but it has not been long before the public and its cost is beyond the capacity of individual weavers. In course of time however, co-operative efforts may, it is hoped, bring about a free adoption of this machine also. So far then as the actual weaving operations are concerned, the improved appliances now recommended by the department for use by weavers are satisfactory. The means adopted to acquaint them with these appliances have also proved satisfactory. The only question that remains difficult of solution is that which relates to the improvement in the preliminary process of sizing warps of cotton. The modern methods adopted in advanced countries have been tried in India, but with little success. I believe that experiments should be continued not only with various kinds of appliances but also with different methods of size mixing, particularly with materials easily procurable in India. In carrying on such experiments, it must be borne in mind that the application of cheap and labour-saving methods should in no wise interfere with the quality of the warp, for if they should, the reputation for durability which hand-woven cloths have long enjoyed would be lost altogether. Hand-loom products form only a portion of the total consumption in the country. The Indian power-loom industry should also be developed alongside of the hand industry.

Woollen weaving.

In wool weaving, the carpet and shawl industries deserve special consideration.

Shawl industry will be a new industry for Southern India and I append a copy of a printed note on the subject which I contributed to the Journal "Wealth of India."

Carpet-weaving.

The carpet-weaving industry in India was once a most flourishing industry largely patronized by Moghul Emperors. After their time, owing to lack of patronage the industry began to decline. The London Exhibition of 1851 in which Indian carpets had been exhibited was however the means of creating a large foreign market, thus giving a strong impetus to the industry. But this was only for a time, as undue competition and commercial rivalry in the business soon led to a deterioration in the quality of the product both in materials and in workmanship. The present position of the carpet industry in India can be summed up in the following words:—There is practically no demand in the country for the costly Indian carpet and the industry must depend for its existence entirely on foreign demand. Foreign countries want carpets of good qualities with natural dyes used in them at very cheap rates. The ignorant carpet weaver unfortunately cannot do any business without a host of middlemen. Between the consumer in a foreign country and the actual worker in India, there are no less than five intermediaries. With low prices offered for finished products and increased rates demanded for raw materials, the carpet weaver finds his position more and more precarious and is every day threatened with extinction. The first question that would suggest itself in connection with the possible resuscitation of the industry would be, whether with all attempts at improvement, it has any chances of survival in these days, when power-loom productions can be had at considerably cheaper rates and when art and luxury are subordinated to utility and economy. This artistic industry stands on the same level as the kindred arts of painting and music, and as the latter have their patrons, so has this industry also. There are art patrons even today all over the world, especially in America who will gladly encourage true art for the sake of art at any cost.

How then can the carpet industry be restored to its original state and further developed if possible? The first requisite is a market for high grade carpets. In the creation of such a market, the Government must needs take the lead by purchasing a certain number of these products for the decoration of important public buildings and the like. When the Government has shown this kind of encouragement, there can be no doubt but that the aristocracy will follow in their wake. A steadier and more resourceful market will however be the foreign market. By means of advertisements and the like, the trade representatives in the foreign countries, of whom mention has been made in a previous paragraph can efficiently exploit the foreign market. In addition to advertising those articles that it has been the custom hitherto to produce, the representatives can ascertain the tastes of other countries and arrange for modifications being introduced in Indian productions accordingly. Having thus created a market, the famishing carpet weaver must be roused to action. The first thing to do will be to grant him loans on easy terms of repayment to enable him to free himself from the clutches of the money-lender and also to purchase good materials.

Of the materials used in carpets, wool and dye stuffs are the most important. As regards wool, apart from the quality of South Indian wool being poor, the difficulty in procuring a sufficient quantity of it is becoming more and more acute. With the expansion of agricultural operations, the area of grazing grounds is diminishing, and no proper attention is paid to sheep-breeding. All kinds of help such as the provision of pasture grounds and efforts to improve the breed should be rendered with a view to make available a better quality of wool at a moderate cost.

With regard to dye stuffs, it is well known that in the carpet business vegetable dyes are insisted on by purchasers. Facilities should therefore be afforded for the carpet weaver obtaining with ease the necessary dye stuffs and for his receiving a sound training in the use of these stuffs.

With proper materials made available for work, with an unfettered discretion in the matter of design and colouring and with the prospect of a good price for his article, the Indian carpet weaver can at any time bring into play his artistic instincts which lay hidden for want of opportunities.

Silk industry.

Q. 112.—I now come to another class of textile industry, viz., the silk industry. The silk industry would mean either the production of silk yarn or the manufacture of silk yarn into fabrics. Both industries are important. The silk industry was once a powerful source of wealth to the country, but it has since gone backward. A careful study of the figures relating to exports and imports of silk and silk goods and a close observation of the silk-weaving industry, as it exists at present, lead me to the following conclusions regarding the present state of the industry in the country:—

(1) The production of silk has considerably diminished.

(2) The price of Indian silk in foreign markets has gone down.

(3) The manufacture of articles such as gown pieces for export to Europe has ceased.

(4) The manufacture of goods for the use of Indians has increased.

(5) A very large quantity of foreign silk especially the Chinese variety has now come to be used in Indian manufactures.

(6) Imports of silk goods for the use of Indians as well as of Europeans and Eurasians have increased.

The marked decline in the industry has been attributed to various causes the chief among them being (1) the poor quality of Indian cocoons due to diseased worms, (2) the defective methods of rearing and reeling, (3) the introduction of several kinds of silk substitutes and (4) the competition of China and Japan. All these causes, it will be seen, are remediable. The quality of cocoons can be improved and the defective methods of rearing and reeling may be set right with the help of experts. The introduction of silk substitutes can be prevented by means of systematised action, if such an introduction be due to ignorance or fraud. The history of artificial silk since its introduction into the market has proved beyond cavil that goods made of that material have established themselves quite independently of genuine silk. The world's demand for real silk has remained unabated and the price of it has been steadily growing. The case of silk goods has a special significance in India where on account of religious and other causes, these goods have a peculiar attraction especially when made of indigenous silk. Coming to the question of competition, the improvements suggested above and a little organisation among the silk producers and manufacturers will surely combat the evil. No doubt, owing largely to the ignorance of the weaver and owing also to the ingenuity and systematised work of the Chinese and Japanese traders, the silk of these two countries possessing no better qualities than those of the Indian varieties but of considerably higher prices often flood the Indian market.

To the Indian weaver cheapness and not quality is the essential requisite, and therefore efforts should in the first instance be directed towards carrying out as many improvements as are absolutely necessary to satisfy the Indian weaver. On the [illegible] that home production should first satisfy home demand, all the [illegible] should be used first to meet the demand in the [illegible] nes of manufacture should be devised; in fact, the production of silk fibre and the manufacture of it into fabrics help each other. It has been said that with a regularly rganised start, India, so eminently fitted in every way for the production of silk, may be ade the largest silk producing country in the world, though at present it occupies he lowest rank among such countries. If the future predicated for it should come o pass, India's aim should be to utilise all her resources in the country. Not only hould attempts be made to manufacture such of those articles as are now imported, but ew methods and means should be used for using up the raw material in the land. 'ower driven factories have been known to take no notice of small orders or of orders equiring special designs or constant changes in them. Hand looms for that reason ave still a place in the industrial world whatever the country of production may be. Vith the material produced in the country and under favourable conditions of labour, ndian hand looms may be profitably employed to make such articles as neckties, ribbons, urtains, umbrella coverings and so forth. Recent experiments made by the department vith the Jacquard machines and swivel shuttles have revealed great possibilities in that ine of work.

Gold thread manufacture.

The manufacture of gold thread on modern lines is deserving of introduction into he country. The quantity of gold thread, especially the finer sorts, used in Indian manuactures is something enormous. The chief raw materials are silk and silver, the former f which, as has been shown in a previous paragraph is essentially an Indian product. t has been found possible in India to reel the silk to the fineness required for finer orts of gold thread. The machinery required to make the thread, viz., the wire drawing nachine, the flattening machine, the threading machine and gilding machines are all vailable now for immediate work at Madras.

The gold thread industry will be one new opening for the use of the Indian silk fibre.

Oil pressing industry.

On account of the enormous resources of the country in oil seeds of various kinds it eems to me that the industry connected with the pressing of oil is peculiarly suited to ndia where labour conditions are favourable. The pressing of oil by means of up to late machinery, the purifying of the same to make it edible and its conversion into various marketable products such as are now made in France can all be undertaken in India with advantage. The two factors necessary to make the industry successful are 1) good machinery and (2) expert assistance. The industry if established will be a ource of wealth to the country, for not only will the manufacture of oil be carried on in he land, but also the refuse of the seeds or cakes as they are called, will be made vailable for use in the country as manure. Ground nut cake alone will be sufficient nanure for a large area of wet land.

Raw products for investigation.

Q. 113.—The supply of various fibres available in the country such as coir, palmyra ibre, aloe, sannhemp, calatropis, and the like affords a very good case for investigation with a view to their development.

Education of weaver boys.

A scheme for the education of weaver boys on the following lines will, I consider, be satisfactory. A boy should be sent to school at the age of 7 and he should ordinarily undergo a course of training for 3 years. The curriculum of study for weaver boys need not necessarily conform to the rules of the educational code applicable to ordinary schools. The important thing to be borne in mind is that an inculcation of ideas of morality that will be useful in business life is as necessary as any other phase of education or even more. This object can be secured by arranging for lessons being given with the aid of moral stories.

Coming to detail, I think that there should be three stages in the education of weaver boys. The first two stages will be in one school which may be called "Weavers' Elementary School". The third stage in the students' career will be gone through in the industrial school. In the first stage which should last three years, that is, until the boy reaches his tenth year, no industrial education of any kind should be attempted. All that the boys must be expected to do during that period is to cultivate habits of attention and punctuality and to learn to observe things. In the second stage, which should last a year, will begin industrial education but it will be of an elementary character. Boys will be made to handle ordinary appliances and do it with care and neatness. The elementary schools must be provided with models of all appliances old and improved. The completion of the elementary school course marks the completion of the necessary preliminary education. This scheme would presuppose that every large weaving centre should be provided with an elementary school in which weaving should form part of the curriculum.

Industrial schools.

The boys when they come to the industrial school should possess the educational qualifications of an ordinary fourth class pupil. The course in the industrial school will last two years and this long period is suggested in order to enable those boys that cannot join a factory or a similar institution, to acquire skill by constant practice. Provision should be made in the school for literary education on general lines but subordinated to industrial education. It would be sufficient to have a few schools and in very important weaving centres.

Technical schools.

These schools must serve also as complete or fully developed industrial schools. Those of the students of the industrial schools who have done very good work in the school and who wish to receive a further training in the higher forms of weaving, such as pattern work, with a view to become master weavers, should be afforded facilities for study in the technical school. For the whole presidency one or two such technical schools will be sufficient. These schools will be the sources of supply of teachers who undertake the education of weavers in industrial schools, and of supervisors or managers of weaving factories.

Stipends. During the first three years of weaver pupils' course no stipends need be paid, but during the succeeding two years as a sort of compensation to the parents, stipends should be offered equivalent in amount to what the boy would earn if he worked at home. Roughly a stipend of Rs. 3 to Rs. 5 might be paid. In the advanced course of a weaver student, a stipend of Rs. 8 to Rs. 10 might be necessary but the student could be made to earn nearly the whole amount of his stipends.

General. Admission into industrial or technical schools should not in my opinion be restricted to weaver caste boys. I have learnt from experience that a non-weaver can, by careful attention and constant application, turn out to be even a better workman than one of a recognised weaver caste or profession. Men of education and means who want training in view to their qualifying themselves as managers and supervisors should be charged fees.

Shawl weaving in India. Before proceeding to discuss the possibilities of establishing in India, an industry in shawl weaving we must consider two important points. The first is whether there is a sufficient demand for shawls in India to make the industry profitable and the second is whether, assuming that there is sufficient demand, facilities exist for getting in the country the raw materials necessary for the manufacture; in other words, whether wool yarn suitable for shawls is available and if not, whether satisfactory arrangements can be made to make it in the future.

As regards the first point, it must be remembered that India is a hot country and that the necessity for warm clothing exists only in the hill stations and in the plains during cold weather. Kashmir which has long enjoyed a reputation for its shawls is a mountainous tract and as necessity creates industries, this place has been the seat of the shawl industry from time immemorial. Kashmir shawls, it is well known, are very costly and can be thought of only by the aristocracy. What then do others do to protect themselves from cold is the question. The lower classes of people have been satisfied with coarse *kumblies*, the middle classes were using till very recently quilted cotton and *dupaties*, the former in Upper India and the latter in the south and it was considered that, in addition to these articles being cheaper they were better protectors from cold than woollen apparel. We find, however, that of late the quantity of imported woollen goods has considerably increased, shawls forming no small proportion of the imports. Evidently the increasing imports are due to a change in the fashion of the people, for which, I think, the large influx of imported German shawls is mainly responsible. Anyhow, there exists, at present, a large demand for shawls.

Coming to the second question, the wool used for the Kashmir shawls and called *pashmina* is a fine downy undercovering of the Kashmir goat which flourishes only in select areas. That it is difficult to get *pashmina* in large quantities for the manufacture of shawls on a commercial scale there is no doubt, and the sheep's wool that can be had all over the country is fit for nothing but *kumblies*. So then, the raw material necessary for shawl weaving is at present not available in the country. And the prospects of getting it in the future are not hopeful. Some years ago, an attempt was made in the south of India to improve the local breed by importing merino rams from Australia and some bales of wool were actually exported to England which were pronounced to be very good for textile purposes, but the experimental sheep farm which had been placed under the charge of a European Commissariat Officer had to be closed as it was found that it did not pay its own expenses. The conditions that exist at present are in no way better and the prospects of getting good results with a repetition of the experiment are at best problematic.

It is clear therefore that, to carry on the industry of shawl manufacture, we should look to other countries for the raw material, but this fact need not discourage any one. We have before us the example of Britain and other great manufacturing countries of the world depending on countries other than their own for the supply of raw materials.

The question of raw material being thus disposed of, we shall proceed to consider if India possesses any special advantages to enable her to compete successfully with other countries in the matter of the manufacture of shawls. Labour is the only determining factor of importance and there is no doubt that labour is generally cheap in India, though unfortunately inefficient. The experiments that were conducted at the Government weaving factory at Salem (now extinct) in the years 1908 to 1910 with the manufacture of shawls with imported yarn showed beyond cavil that, in this particular industry, however sufficiently cheap and efficient labour could be had in the country which would produce an article that can successfully compete with the imported German shawl. The material used for the experiment was obtained through one of the important European firms in Madras in the form of cops and spools. The quality of the woven shawl was pronounced excellent by several firms engaged in the trade and the working expenses connected with the manufacture were indeed so small that the business promised to yield a very good profit on the capital invested. Such were the results of the experiments carried on in Salem but similar experiments made in Madras in the years 1911 and 1912 were not followed wit the same satisfactory results. Even so, it would appear that the finished product was well able to compete with the imported German shawl. The difference in the results was mainly due to the fact that labour in Madras was dearer than in Salem. Indian labourers though constitutionally very negligent and immobile can be trusted to turn out good work under proper supervision, and experience has amply proved that it would pay in the long run to have efficient though costly supervision. One important item that should always be borne in mind in determining the place of manufacture is the cheapness of labour available in the place. With proper supervision, labour can be made more efficient than it would otherwise be.

Year by year, the cost of living becomes greater and labour consequently gets dearer. There can be no doubt that if an attempt were made now to produce shawls in Salem similar to those made in 1908-10, the working expenses would be greater than before, but it must be remembered that this circumstance is common all over the world and affects no one industry in particular.

The manufacture of woollen goods has some special advantages over the manufacture of cotton goods which make the Indian weaver's work considerably easy. These advantages relate to the process of "sizing" which the wool yarn does not require but which is indispensable to the cotton yarn and gives no small trouble to the Indian weaver. If the yarn is got out in cops and spools, the former for warp and the latter for weft, all that requires to be done is to prepare warps to be put on the loom. It has often been pointed out that the preliminary processes that the yarn should undergo before it is fit for weaving are even more important than weaving itself, as the facility for weaving and the quality of the woven fabric largely depend on the satisfactory treatment the yarn receives, and when these preliminary processes, which, in India, would take considerable time, have been previously finished elsewhere, one can very well understand how easily the Indian weaver with his inherited skill and few wants can produce a cheap and good article. In speaking of the experiments referred to above, mention must be made of the fact that the fly shuttle was used to weave the shawls. An ordinary weaver earning between 4 to 6 annas was easily able to produce in a day of 8 hours between 3½ to 5 yards, while a clever weaver could make nearly three shawls.

Labour conditions being favourable to the manufacture of shawls in the country, the next question to be considered is the source of supply of the raw material One would naturally think of the United Kingdom in this connection where woollen manufacture is the oldest branch of the textile industry and where the industry is spoken of as having "long been the glory of England and the envy of other nations." Native English wools are long stapled and are best adapted for the worsted industry for which England has long been noted. The home clip of wool is estimated at 130,000,000 lb., annually; of which 30,000,000 lb. are exported. Even to-day wool forms the principal agricultural export of the United Kingdom. English wool will be quite good for shawls and it may, therefore, be got out for the purpose.

Australia is another place from where wool of excellent quality can be had. In fact, it is the greatest wool-producing region in the world and furnishes half the world's consumption. South Africa is another place. Australia and South Africa are the two principal countries that supply wool to the United Kingdom and it is estimated that the two together supply annually, not less than 500,000,000 lb. We have already pointed out that the mere supply of wool, as distinguished from woollen yarn, is no use for shawl manufacture in India and it would, therefore, be necessary to import woollen yarn, and if this can be done, the shawl industry may be started on a firm basis and carried on successfully.

In speaking of wool and woollen yarn, I think it would be desirable to explain what worsted means. The word "worsted" is derived from a village of that name in Norwich which is the leading centre of woollen manufactures. All long stapled wools are combed and then spun into what is called *worsted* yarn. Short stapled wools on the other hand are carded and are called woollen yarn in a restricted sense.

ORAL EVIDENCE, 25TH JANUARY 1917.

Mr. A. Chatterton.—*Q.* You have been working on these industrial questions for some very considerable time. You refer to your experience in the aluminium and chrome leather industries. How did you first become connected with aluminium?—*A.* I was appointed office manager of the aluminium department.

Q. And as regards chrome leather?—*A.* I was put in charge of the business portion.

Q. And later on you took up weaving?—*A.* Yes.

Q. You had no previous knowledge of weaving, or any practical experience of it before you were put in charge of it?—*A.* No.

Q. How long is it since you began to work in the weaving branch?—*A.* I began in 1902.

Q. And when did you go to the Salem Weaving Factory?—*A.* In 1906.

Q. The Salem Weaving Factory was closed under the orders of the [illegible]?—*A*. Yes.

Q. When?—*A*. About September 1910.

Q. Some time later on, I understand you made a survey on the results of the work in connection with this weaving. Can you state briefly what was the result of the various experiments that had been made in Madras and certain industrial schools to introduce improvements into the hand-loom industry?—*A*. In many of the East Coast districts a number of fly-shuttles were brought into use as a result of the initiative work that Government did.

Q. How many?—*A*. I counted about six thousand at the time.

Q. Have you any knowledge now as to the extent to which it has spread?—*A*. To twice or thrice the number. It would be about 20,000.

President.—*Q*. About how many weavers are there in the presidency?—*A*. I cannot say.

Mr. A. Chatterton.—*Q*. You have been going about the country with peripatetic Weaving parties. Have you met with any success through the agency of these parties?—*A*. Yes.

Q. How many looms have been introduced in consequence?—*A*. About six to seven hundred.

Q. In how many years?—*A*. In about four years, but during the last year there was very little work on account of the war.

Q. On the East Coast you say that 20,000 fly-shuttle looms were introduced with comparatively little effort on the part of the department. Now you are making very vigorous efforts in certain parts of the country and have been able to get six or seven hundred looms in. Is there any particular reason why, in the one place, the work should be extremely successful, whilst in the other it is a matter of very small growth?—*A*. It is a matter of time. It will develop gradually; even there it developed gradually.

Q. Is it a matter of the organisation of the trade at all which affects it?—*A*. That has also got to do with it.

Q. In what way?—*A*. For instance in the Kambayam or Kaili trade there is an organisation on the East Coast districts for the disposal of manufactured goods and so the weavers are able to get advances very easily, and work them off soon.

Q. From whom do they get these advances? Is it from the merchants in Madras?—*A*. Yes, also from local agents.

Q. You have a highly organised method of disposing of the articles that you manufacture?—*A*. Yes.

Q. And that tends greatly to popularise any method to improve manufacture?—*A*. Yes.

Q. Would you ascribe the success of the work of the department in that part of the country to the fact that there already exists a highly organised mercantile method of disposing of the products of manufacture?—*A*. I think each helped to develop the other. The organisation was better developed after the introduction of the fly-shuttle.

Q. Whilst with the peripatetic parties have you made any attempt to start co-operative societies or introduce any kind of organisation?—*A*. I did not stay sufficiently long in any place to attempt it.

Q. Have any local attempts been made?—*A*. Not that I know of.

Q. Putting it in rupees, annas and pies, what do you suppose the weaver gets through using these improved methods of working?—*A*. While an ordinary man gets Rs. 7-8-0 the fly-shuttle weaver wil get Rs. 10 a month.

Q. Are you acquainted with the hand-loom weaving factories which were started some years ago. Are any of them now working successfully?—*A*. None; they have all come to grief.

Q. Why is that?—*A*. Three or four causes can be given; want of skilled managers who know the business; disunion among the management; but the greatest obstacle is the labourer himself. A man who knows anything about fly-shuttles demands wages out of proportion to his real worth. He takes advances and runs away. The men are unable to control them, and there is no means of recovering the money. If the employer files a suit he will be spending extra money uselessly.

Mr. C. E. Low.—*Q*. Are the weavers already indebted?—*A*. Yes, generally.

Q. Has their running away from these factories anything to do with the fact that they are indebted to somebody else?—*A*. Yes, some of them used to come to these factories and take money but before they could work off the advance they would go back to their previous employer.

Mr. A. Chatterton.—*Q*. Have you any idea of the number of factories started?—*A*. I know of a dozen.

Q. Were there more?—*A*. Probably there may have been.

Q. How many weaving factories are there in existence [illegible] still running?—*A*. There are, I think, half a dozen [illegible].

Q. They are doing a large business, many of them?—*A*. I don't know what is happening after the war. Before that they were doing good work.

Q. Why is it that the weaving factories on the West Coast are successful, and the fly-shuttle industry on the East Coast likewise so, but in the middle part practically nothing is done?—*A*. On the West Coast the employes are all Indian Christians. They have been under obligation to some of these Missionaries. They are fed and clothed there, and the employers have control over the men, so they rarely run away.

President.—*Q*. They get elementary education?—*A*. Yes.

Mr. A. Chatterton.—*Q*. Besides the Basel Mission, there are a certain number of private factories running on exactly the same lines?—*A*. I don't think; there may be one or two. There was one that came to grief on the West Coast.

Q. There were factories started in Madura, one of the largest weaving centres in the presidency. Do you know why that large factory which was started for weaving bordered cloths came to grief, although there was plenty of capital behind it?—*A*. Mostly on account of labour difficulties. The workmen used to swindle gold thread, silk, etc., and after some years when the proprietors took stock they found that a large part of the stock was missing.

Q. Are the weavers usually illiterate?—*A*. Yes.

Q They suffer very badly from want of education?—*A*. Yes.

Q. Do you know if attempts were made to introduce education among weavers some years ago?—*A*. You recommended it, but I don't know if it was put into effect.

Q. There is a term which has been introduced of late years called the "Master weaver", do you know what it means?—*A*. In other words they are foremen.

Q. They are men who could be foremen?—*A*. Yes.

Q. Is it likely that by training in special institutions, such as the one which is under erection at Madura, that this class of Master weaver, with a thoroughly good training, would be able to go into the weaving villages and introduce a kind of organisation among the weavers, without actually starting a factory which would be successful?—*A*. It is very doubtful.

Q. Do you think if you put up a warping mill and gave out work to the weavers in their own homes, that the weavers would work there?—*A*. I think the preliminary step should be to educate the weavers before they could receive any improved ideas.

Q. Would the influence of the Bania, who has got the weaver more or less in his clutches, be so strong as to prevent any efforts towards that end?—*A*. Oh, yes; it will.

Q. If you are going to try and improve the whole of the weaving community, is it necessary that we should first establish something in the way of co-operative credit societies among them, so as to gradually get them into a better financial position?—*A*. Yes.

Q. The second step is to educate them?—*A*. Yes.

Q. And the third to provide these Master weavers with an organisation dealing with the technical and commercial side?—*A*. Yes.

Hon'ble Sir R. N. Mookerjee.—*Q*. Who was the guiding spirit during the rapid development of the Madras weaving industry?—*A*. Mr. Chatterton.

Mr. C. E. Low.—*Q*. Will you describe how a peripatetic demonstration party works; how it demonstrates the fly-shuttle loom?—*A*. The party consisting of the Superintendent and two or three maistries goes to certain villages with looms. They make a preliminary survey to find out which villages need help. Then they select a place where all these weavers are gathered. They put up a loom and then demonstrate it actually.

Q. How do you get the weavers to come and look?—*A*. With the help of the revenue officials. We gather the men by means of tom-toms. Then we explain the object of the demonstration and then give actual demonstrations.

Q. How many days do you stay in each village?—*A*. It depends upon how the villagers receive the party and want to be benefited by the advice given. In certain places it has taken weeks without any effect; in other places one day's work has produced marvellous results. It all depends upon the men and the influence the Bania has in any particular village.

Q. Is the influence of the Bania against the fly-shuttle loom?—*A*. Yes, they don't want these individual weavers working under them to improve their position and get away from them. They want to keep them always in their grip. If they find these fellows earn a little more so as to be able to purchase fly-shuttle looms themselves, they don't like it.

Q. Do you know anything of the Conjeeveram Weaver's Society?—*A*. I don't know much about it.

Q. Is it not the case that these Chetties who are very often superior weavers have men working for them in their houses?—*A*. Yes.

Q. And they make a profit on it?—*A*. Yes.

Q. Although these factories could not succeed?—*A*. Because the ordinary weaver does not like factory life; he does not want to subject himself to any discipline. He can work at home as he likes.

Q. How does the Chetti manage; does he make them work in his house sometimes?—*A.* Nobody goes to the Chetti's house; the Chetti gives advances and they work at home.

Q. What I asked was whether there was any of this class, the rich weavers, who have several looms in their house operated by other weavers, or by paid labour?—*A.* That is very rarely done; generally each weaver is allowed to work in his own home. The yarn is advanced and a week's wages are also advanced.

Q. But the Chetti has hold over the man who works in his own house, so that if the Chetti cast him off, he could not borrow from anyone else; is that so?—*A.* Yes.

Hon'ble Pandit M. M. Malaviya.—*Q.* How long have you been engaged in this work of spreading weaving factories?—*A.* Nearly fifteen years.

Q. Where did you learn the art yourself?—*A.* By constant application.

Q. You say that these peripatetic weaving parties visit various parts of the country; besides yourself, is there anyone else going about with these parties?—*A.* Yes, there is one else.

Q. How many districts do you visit in the year?—*A.* I visited about six districts in the course of three years.

Q. And your assistant or colleague?—*A.* He was appointed only last year; he has visited, I think, two districts.

Q. Do you think there is need for more persons like you moving about the province, in order to meet the requirements of the whole presidency?—*A.* Yes, one or two assistants may help us; for instance they may be in a position to re-visit the place where a demonstration has been held and help with advice. As it is, we are not in a position to go back to the villages once visited.

Q. Do you confine your attention to explaining to them these matters about weaving, or do you also instruct them about the principles of co-operation?—*A.* I tell them the value of organisation. I go about preaching. Of course by illustrating certain specific cases I tell them how beneficial it would be to organise themselves.

Q. You say that much is needed in the way of co-operative societies to improve the condition of the people?—*A.* Yes.

Q. You have no co-operative societies for these weavers?—*A.* No.

Q. Except the union at Conjeeveram?—*A.* Yes.

Q. Have you made any efforts to create such societies?—*A.* I thought it was the work of the Registrar of Co-operative Societies.

Q. About these itinerant exhibitions that you suggest do you want them in addition to these peripatetic societies?—*A.* As part of it.

Q. What would you exhibit to them; what particular things; would you confine the exhibitions to matters relating to the weaving industry, or make it general?—*A.* I would have them with particular reference to the weaving industry.

Q. Do you find the weavers coming cheerfully to watch your demonstrations?—*A.* Not for some time. They view it with suspicion at the beginning, because they think that as it is a Government weaving party, it must work with a view to eventually taxing them.

Q. When you take in particular young men to learn this art of weaving, have you to offer them any scholarship or awards?—*A.* At present we don't; we simply demonstrate and go to the weaver's house and take in all sorts of men, adults and others.

Q. You say that the banking facilities at present available are only for big firms that export goods direct?—*A.* Yes.

Q. You suggest that better banking facilities should be provided?—*A.* Yes.

Q. What would you have; industrial banks especially which would offer loans on the security of building machinery and goods?—*A.* And stocks. With regard to weavers, banks on co-operative principles; for other industrialists industrial banks.

Q. Would you have one bank in the province with branches in industrial centres?—*A.* Yes.

President.—*Q.* You have had no experience of banking?—*A.* No.

Q. You don't want these answers to be taken down seriously as your professional opinion?—*A.* I have been asked these questions, so I answer.

Hon'ble Pandit M. M. Malaviya.—*Q.* Do you gather the panchayats of these weaving communities wherever you go?—*A.* Yes, but they are of no help to me, because their help is sought by weavers only in settling caste disputes. They don't help them in their trade or business.

Q. You suggest the establishment of industrial schools, and that factories should be attached to them in order to give practical training?—*A.* Yes.

Q. From your experience do you think the artisan classes will be gradually drawn to these schools?—*A.* Yes.

Q. At what age do the boys of weavers begin to work at their homes?—*A.* From their ninth year.

Q. Up to then, at any rate, you think that they should be made to receive instruction of an elementary kind?—*A.* Up to their tenth year they can.

Q. Beyond that period do you think their parents will be willing to send them to school for two or three hours a day?—*A.* Provided they are given some stipends.

Q. Without stipends you don't think they would be attracted?—*A.* No.

Q. Is it due to their poverty?—*A.* Yes, mainly to their poverty.

Q. With regard to the silk industry, you think that with the improvements you have suggested, and a little organisation, Indian silk will still be able to compete with China and Japan silk?—*A.* Yes

Q. To what do you ascribe the great popularity of China and Japan silk?—*A.* To the evenness of the thread.

Q. You think with better organisation you could produce the kind of thread required?—*A.* Yes.

Q. How does the Indian silk compare in point of durability with the Japanese?—*A.* Indian silk is better. The Japanese silk available here is of the worst kind, and nobody here goes in for Japanese silk. They use China silk. More than 75 per cent of the silk used here is China silk.

Q. The import of Japanese silk has increased generally?—*A.* I don't think; at any rate, as far as the Madras Presidency is concerned, I can say with confidence that very little is in demand here, because they don't get the good quality.

Q. You suggest that for the gold thread industry what is needed is the machinery to make the thread, and you think that the thing will be successful?—*A.* It may be tried.

Q. Do you think the capital will be subscribed for it?—*A.* If Government take an interest in it, I think the capital will be subscribed.

Q. With regard to the oil-pressing industry also, you say that "the two factors necessary to make the industry successful are (1) good machinery and (2) expert assistance." There also you don't mention capital. Do you think capital will be forthcoming?—*A.* Yes, I have said that in the first paragraph.

Q. Don't you think that if the Department of Industries published information regarding the possibilities of these industries, people would come forward to take them up?—*A.* That will do an immense amount of good; whether they will immediately come forward is a different question, but that will be very useful.

Q. If the officers of Government made it a point to circulate information on these subjects, and showed their interest in the development of these industries, do you think that would lead to any great result?—*A.* Yes, and especially it must be done in the vernacular, by means of pamphlets and leaflets.

Q. Why was the proposal to impart elementary instruction to the weavers' boys not carried out?—*A.* It is too much for me to say.

Q. When was that proposal made?—*A.* That was made in 1912.

Q. You have heard nothing more about it since then?—*A.* I don't think it was approved.

Q. You think there is no hope of progress without that proposal being carried out?—*A.* No hope.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* In one paragraph, you say that you have just trained these boys who were waifs and strays. Where have these boys gone after learning in your school?—*A.* I think they must have gone to the several factories, one by one.

Q. Then these boys that you train up don't go into the cottage industries themselves?—*A.* Some of them do.

Q. Do you know anything about the silk industry here; the handloom weaving?—*A.* Yes.

Q. Where is the silk imported from?—*A.* Mostly from China at present.

Q. You say here, "No doubt, owing largely to the ignorance of the weaver, and owing also to the ingenuity and systematised work of the Chinese and Japanese traders, the silk of these two countries possessing no better qualities than those of the Indian varieties but of considerably higher prices, often flood the Indian market." Do you know the whole thing, how it is going on, how it is brought in, etc.?—*A.* I have made enquiries. I know the Mysore variety.

Q. What is the quantity of the Mysore variety?—*A.* It may be small.

Q. Then if Mysore is not producing large quantities, and if they want a larger quantity they have to buy outside?—*A.* Even the available quantity is not all taken up locally.

Q. I suppose the Chinese pays them much more?—*A.* It is more costly in the ultimate.

Q. But it is more taken up by the people?—*A.* The Chinese variety is taken up because we have an even thread there.

Q. And the Chinese is also sold cheaper?—*A.* Yes, but the cheapness is only apparent.

Q. It has always been on the increase for some time?—*A.* Yes, in fact 90 per cent of the silk used here is Chinese silk.

Q. Is silk handloom industry increasing?—*A.* Yes.

Q. And cotton handloom weaving, is it going down or improving?—*A.* Neither; I think it is maintaining its position.

Q. Do you think if more factories were started in this presidency, it would be on the decline, or would it be able to compete with textile goods?—*A.* The handloom has a field of its own in certain kinds of goods.

Q. If the people want to have cheap goods I suppose they will?—*A.* On account of the durability of hand made cloths they are prepared to pay a higher cost for them.

Q. Then about wool; do you know anything about woollen goods here?—*A.* Yes.

Q. Is there any handloom work going on?—*A.* We were making shawls in the Salem factory. I have referred to it in my note.

Q. You talk of Australian wool; do you know anything about Tibet wool, which is manufactured here very largely?—*A.* I know about Madras wool. About Tibet wool very little is used here.

Q. Have you seen the Cawnpore Woollen Mill products?—*A.* Yes.

Q. The shawls which you talk of are they not easily taken up here?—*A.* Our shawls had a better demand than those manufactured by the Cawnpore Woollen Mills.

Q. Then you think this industry can be expanded here?—*A.* Oh, yes.

President.—*Q.* Can you weave yourself?—*A.* Yes.

Q. Are you an expert at it; do you actually do the weaving yourself?—*A.* If by an expert you mean a skilled weaver, I am not: I cannot turn out as much as an ordinary weaver, a professional weaver.

Q. Can you help them out of their difficulties if you are not a skilled weaver yourself?—*A.* Oh, yes; I can always set them right when they go wrong.

Q. Don't you think it an advantage to be an expert weaver? If you were don't you think it would excite the weavers to better things?—*A.* If in India a man who is both an expert weaver and a skilled Superintendent could be found, it would be better no doubt.

WITNESS No. 219.

MR. H. ANANTASUBRAHMANYA AYYAR, *Proprietor, South India Candle Works, Madras.*

WRITTEN EVIDENCE.

Government patronage.

It is possible to get capital for any industry from the people, if they are made to understand that the management is in capable hands. The Government need not help any industry directly with capital. It is sufficient, if the Government buys for their own requirements, whenever available, the Indian made articles in preference to the imported ones, even though the Indian made articles are a little costlier for equal qualities. The Government may publish from time to time a list of articles required by them.

Banks.

The Presidency Banks may be required to open industrial sections to advance money to industries on the loan of machinery or stock-in-trade on favourable terms, or separate industrial banks may be opened in important towns by the Government to serve the same purpose. But the money help for the industries should come from banking agencies only and not from the Government direct. The Government help also should be strictly limited to industries started and managed by Indians with Indian capital; for those industries started by others with their own capital aim at profit without any benefit to the Indians.

Technical aid.

Government may help industrialists to get technical experts from foreign countries through the Commercial Intelligence Department. If every industrial organization is provided with a competent expert, there will be no necessity for the Government to lend their experts. The Government should see that every Indian who is desirous of undergoing industrial training abroad is admitted into the respective factories for training without trouble.

Commercial museums.

Commercial museums may be established in all the provincial towns to bring closer the producers and the consumers. Industrial exhibitions also may be organised in all the important towns at least once a year and the merit of individual manufacture may be recognised by granting medals and certificates for excellence.

Technical education.

Technological institutes, industrial schools and commercial colleges should be established in all important places and industrial education should be given broadcast that the future generation may have a liking and aptitude for industrial pursuits.

The present system of education makes the youth of the country fit only for subordinate Government services and consequently the desire to enter Government service is born with them. This desire for Government service in the youths should be replaced by a desire for independent commercial and industrial pursuits by imparting technical and commercial education. Then, and then only, is any development of Indian industries by Indians and for the benefit of India possible. Elementary education also should be made free and compulsory so that the general public will be able to understand the benefit of industrial advancement to their country.

Mechanical engineering colleges should aim more at practical works than theories. Every engineering college should be attached to big workshops where all kinds of practical training may be imparted to the students. The engineering colleges now have practical work only in name and unless more attention is paid to the practical side also, the graduates turned out from these institutions will not be of much practical use either to the country or to the Government.

Railway freights.

The existing railway tariff rates are a great bar to the advancement of industries. The railway has introduced very low rates between places served by steamers. They may extend the same concession rates to the Indian manufactured articles and the raw materials used in the manufacture thereof. The Railway Board in their administration report for 1914-15 have expressed a pious wish to quote favourable rates for raw materials and their manufactures, which if carried out in practice will be of immense help in the development of indigenous industries.

ORAL EVIDENCE, 25TH JANUARY 1917.

Mr. C. E. Low.—*Q.* What is the capital of your concern?—*A.* About Rs. 20,000

Q. Is that your own money, or have you got it from the public?—*A.* It is my own money.

Q. When did you start these works?—*A.* In 1909.

Q. How did you find out to make candles?—*A.* I had a man with me who had studied it in Japan.

Q. You employed him?—*A.* Yes.

Q. How did he go to Japan? Who sent him there? Did he get any scholarship?—*A.* Yes.

Q. Where from?—*A.* From some private persons.

Q. Do you sell your candles at a profit?—*A.* Yes.

Q. Have you extended your business at all?—*A.* Yes.

Q. Do you sell your candles locally or in other parts of the presidency also?—*A.* In this presidency alone

Q, You do not sell in Ceylon?—*A.* No.

Q. Which candles compete with your goods?—*A.* Goods from England

Q. And from Japan?—*A.* No.

Q. And you can sell as cheap or cheaper?—*A.* Cheaper.

Q. What are they made of?—*A.* They are made of paraffin and stearine

Q. You find it difficult to get stearine?—*A.* I do not get it now.

Q. How many labourers do you employ?—*A.* About a dozen.

Q. Did you find that you made mistakes in the beginning?—*A.* I made mistakes

Q. How long did you take to make the thing on a profitable basis?—*A.* About a year.

Q. Do you make soap?—*A.* I am making for the last two years.

Q. Where do you get soap stock?—*A.* I make soap stock myself

Hon'ble Pandit M. M. Malaviya.—*Q.* You suggest that the presidency banks should open an industrial section to advance money to industries. If that is not done, would you have separate industrial banks?—*A.* Yes.

Q. You say further that help to industries should come from banks and not from Government direct. Do you think that the public will subscribe to these industrial banks if the Government does not show by its action that it supports the banks either by putting in a little money into the banks or guaranteeing interest?—*A.* By industrial bank I mean that it should be started by Government.

Q. Suppose the Government does not start the bank entirely with its own money would you then wish that the Government should give it its moral support and also its financial support to some extent?—*A.* Yes.

Q. Do you think that the public will then subscribe to the funds of the bank?—*A.* Yes.

Q. You suggest that the Government should see that every Indian who is desirous of undergoing industrial training abroad is admitted into the suitable factories without trouble. Is not that more than the Government can ensure?—*A.* At present we find it very difficult to get admission into factories there.

Q. What is your experience in regard to this matter? Did you go to Japan?—*A.* No.

Q. Then you have no personal experience of what the difficulties are?—*A.* I have not gone out.

Q. You say that elementary education should be made free and compulsory. But do you want that there should be some elementary science added on to it and manual training and drawing, in order to develop a bias for industrial pursuits?—*A.* Yes.

Q. You want technological institutes, industrial schools and commercial colleges to be established in suitable centres. Do you think that such institutions will create a better knowledge of industries and industrial possibilities and a desire to invest money in them?—*A.* A better knowledge and a longing for industrial pursuits.

Q. Do you think that the desire for Government service will be really checked if such institutions are established?—*A.* Yes. Some of them will be diverted to industrial pursuits.

Q. Why do so many of our young men desire to enter Government service?—*A.* Because the education is such as to make them fit only for Government service.

Q. Do you think that if there were openings for other careers, our young men would take advantage of them?—*A.* Certainly.

Q. You say that the existing railway tariff rates are a great bar to the advancement of industries. What do you suggest in the way of remedy?—*A.* Railways quote different rates for places served by steamers. They are low rates. If such rates are allowed for Indian manufactured articles and the raw materials used in their manufacture it would be very good.

Q. You want an attitude of favourableness or friendliness towards Indian manufactures similar to that adopted towards goods which are exported?—*A.* Candles imported at Bombay are brought to Madras at a very cheap rate but I cannot sell mine at Bombay at such reduced rates even if I get offers.

Q. Do you mean to say that the candles which are imported are carried by rail here at cheaper rates?—*A.* I do not mean candles, but for certain articles, they have got port-to-port rates from Madras to Calcutta, Bombay to Calcutta and Bombay to Tuticorin and so on.

Q. They are brought by steamers?—*A.* By train.

Q. Are you sure of the fact?—*A.* Yes. They have got port-to-port railway rates.

Q. These operate to the disadvantage of the indigenous manufactured goods?—*A.* Yes.

Q. What remedy do you suggest for that? Do you think that if the Government managed all these railways this would be remedied.—*A.* The greater portion of the railways belongs to the Government.

Hon'ble Sir R. N. Mookerjee.—*Q.* You found all the capital for your industry?—*A* Yes.

Q You are against Government giving any financial assistance to any industry?—*A.* Yes.

Q. You are not willing that members who are less fortunate than you are should get Government financial help?—*A.* I am afraid of too much interference. If Government invest their capital in that way they will interfere in business also.

Q. If other people want money you think that Government should not give assistance to them?—*A.* They can get from the people if the business is managed properly. I was speaking of direct Government assistance. I do not want Government to help direct. They may establish industrial banks or they may ask the presidency banks to give help to industries.

How can Government help indirectly?—*A.* The presidency banks do not help Indian industries. Since Government help the Presidency Banks they may ask them to help industries.

Q. Do you mean that the presidency banks should be forced by Government to lend money?—*A.* I do not mean that they should be forced. Because the Government help them, they have got power to ask them.

Hon'ble Pandit M. M. Malaviya.—*Q.* The Government should help industrial banks either they should start them with their own money or help them with a portion of their money. Is that your meaning?—*A.* Yes.

Q. Because the Government helps the presidency banks with some of their money, it should bring moral pressure to bear upon them?—*A.* Yes.

Q. If that cannot be done under the present constitution of the presidency bank, your object will be gained if a separate industrial bank is established helped by Government to some extent?—*A.* Yes.

Q. So that industries should receive help through banking agencies?—*A.* Yes.

WITNESS No. 220.

MR. A. KRISHNAYYA, *Acting Deputy Tahsildar, Sullurpet, Nellore district.*

WRITTEN EVIDENCE.

Technical aid.

Qs. 17 *and* 18.—Where Government technical experts of the Geological Survey Department or the Department of Mines are indented for by private companies, they may be helped subject to payment of the pay of the officer, [illegible] ances. He must be at liberty to publish the result of his [illegible] such as would affect the value of the property of the company which engages him.

Government publications.

Qs. 87 *and* 88.—The Geological Survey monographs are read with interest by English knowing mine owners and those interested in the mining industry. Ordinarily, the mine owner is a layman, and is interested in the mining industry from the commercial aspect. He is not interested in palantological descriptions and the optional properties of minerals. If the Geological Survey Department could conveniently publish monographs eliminating the purely scientific portions mentioned above at a cheaper price than at present fixed, I think these publications will be more popular

Commercial intelligence.

Q. 83.—This is a great need for mine owners. So far as my district is concerned, except the local purchasers, the producers do not know the true market value. They merely sell goods to intermediate local purchasers at Government schedule rates or some per cent over. Till Mr. H. A. Brandt's firm closed on account of war, it had almost a monopoly. Further, certain sizes seem to be more in demand than others, and if the producer knew of the demand, he could suit himself to the market. These details are not known to him. At present, the intermediate purchaser is appropriating profit which should go to the producer. To enable him to earn more profit and keep his business going, it is desirable to publish in the local district gazettes the values of the several minerals periodically through the geological special provincial Revenue officers referred to above.

Pioneer factories.

Q. 6.—My district produces a lot of mica splittings and all are exported in that condition. I suggest a micanite factory may be started by Government from State funds or partly from State funds and partly from private capital subscribed by mine owners and others.

A pottery factory may also be established. China clay is available in my district and in Gōdāvari also. Felspar is also largely available in the Presidency. Costly factories may not be within reach of individual purchasers. When applications are made, the capital spent may be divided into shares which can be sold and the factory left to private enterprise.

Freights.

Qs. 97 *to* 99.—Excessive railway freights are a hindrance to minor mineral exploitation. For instance, China clay is available in the district. It was approved by some firm in Calcutta, but the cost of transport is too prohibitive for export, and the deposits lie idle. The same is the case with certain deposits of the same mineral in the Gōdāvari district and felspar that was required by the Industrial Exhibition Superintendent, Morvi State. China clay is very largely wanted both in Calcutta and Bombay. This difficulty applies to potstone also whereby the value of the culinary vessels made of it was partly enhanced. Fine building stone of *laterite* 2 ft. × 6 ft. also is found in my Deputy Tahsildari, but my inquiries show that the cost of transport is too prohibitive to organize an industry in respect of this commodity. A reduction in rates will be necessary in the case of all minerals paying a royalty of 2½ per cent and less.

Co-operative societies.

Qs. 11-12.—At the instance of the present Collector, Diwan Bahadur R. Ramachandra Rao, an oil-pressing industry was started on the co-operative system at my head-quarters Sullurpet, mainly to supply oil-mongers with gingelly seed, to advance capital to purchase raw products and to help in sales. The administration is in the hands of a *panchayat* which has powers to raise capital from members or from outside, as from the Permanent Benefit Fund, Nellore, and the Central Urban Bank, Madras. Capital is being supplied by the society to the members who are being freed from the oppression of private money-lenders. They are deriving enlarged profits. It is too soon to say much about the results of the society as a whole as it is only two years old. There were instances where on account of cost of railway freight for getting gingelly from distant parts and cost of production, members were not able to accept orders. Machine-pressing may reduce cost of production, and machinery may be supplied on the hire system to such societies (question 19). Such societies may be encouraged for oil-pressing, weaving, and rice-husking in this district. Demonstrative factories may be established for the first and second (superior counts) and also for the supply of chemical manures in places where raw products are largely produced. State aid may be given in the case of raw products now exported and received back as finished products to the extent that cost of local production is equal to cost of delivery of finished article.

Commercial museums.

I have no experience of the commercial museum at Calcutta. As a matter of opinion I think, one may be established by State or private enterprise or by both at the headquarters of every Presidency. It may be worked on the following lines:—

(1) To register original producers as fit for exhibiting articles on payment of a small fee.

(2) To exhibit articles sent by producers free at their risk.

(3) To recover a small commission on articles actually sold at the museum.

(4) To enquire and inform buyers of likely markets for articles produced.

(5) To register and communicate orders of buyers to producers and to supply on payment of commission.

Trade representatives.

It is necessary to establish trade representatives in Great Britain and the Colonies and other countries. Their duties should be to advise exporters as to the condition of the markets regarding stocks and values, and generally to advise producers as to the needs of buyers and help sales. It has been a common experience that direct exporters of mica have, for want of advice, suffered short falls, an experience which has practically stopped producers direct export.

Forest Department.

Qs. 105-107.—Where suitable climate conditions and soils exist, the Forest Department may concentrate valuable plantations of trees or plants fit for building, dying and medicine, such as valuable teak of the Burma kind, sandal trees, Surati, Divi-divi, chiriveru (dye); the last is extremely valuable in dyeing cloths in respect of which there used to be a considerable industry in this district.

Railways.

Q. 97. The cost of transport of mining produce is 3 to 4 times district sanctioned rates for carts. Besides mica the district poduces salt and rice. The two last produced are largely in demand in the western inland districts of the Presidency and for want of a direct railway route the goods go circuitous ways. The cost of transport is increased. A railway extension from Nellore to Cuddapah by way of Podalakur, reported to be under the consideration of the District Board would be much appreciated, if executed. This has the advantage that it would open all reserved forests along the line for collection of fuel which is getting to be dear.

NOTE.—*Witness did not give oral evidence.*

WITNESS No. 221.

SIR CLEMENT SIMPSON, *Binny & Co., Limited (Madras).*

WRITTEN EVIDENCE.

Capital.

I do not think that conditions in India for raising capital for an established industry by persons experienced in that industry are more difficult than in England or elsewhere.

Government assistance.

It is difficult to give definite answers to any of the questions asked as each proposition would require consideration on its merits and under certain conditions and limitations each of the methods suggested might be desirable. Broadly, I should say that in all cases where there is not adequate security in the form of mortgage or collateral security, Government inspection which implies a certain amount of control, would be desirable. In important enterprises a Director or Directors appointed by Government (not necessarily Government officials) would appear the most suitable.

Pioneer factories.

Pioneer factories should in no case be started or assisted by Government when private enterprise has demonstrated that similar factories are commercially practicable. I have no objections to offer to financial aid to pioneer factories that will not compete with existing industries.

The industrial development of the country by private enterprise should be encouraged to the utmost and Government pioneer factories be resorted to only as a last resort to introduce an entirely new industry.

Pioneer factories that will help to make India self supporting, i.e., factories that will find an outlet for their productions in India should be given preference over those for export.

Pioneer factories should be handed over to private capitalists or companies at the earliest date that buyers can be found.

The only limit or restriction in handing over such factories should be military needs in which case the factories would, I assume, be handed over to the Military Department.

Limits of Government assistance.

I do not think that Government aid should be given in any case when it is demonstrated that such aid will compete with private enterprise.

In some cases when the commodity to be produced is of low value I recognise that Geography must form a consideration.

Demonstration factories.

These as defined in the questions, seem to me unnecessary and undesirable.

Surveys for industrial purposes.

I think Government might render private enterprise very valuable assistance in advising and giving information about suitable sites for industrial enterprises and assistance in acquiring such sites. Location of a factory is very important in relation to water, fuel, temperature, railway and other facilities, and Government departmental records and surveys should enable Government in many cases to give very valuable information to private enterprise. The fact that Government are willing to give such information as they can should be given every publicity.

Commercial museums.

These are interesting to the individual but I attach no particular value to them from the large producer's standpoint.

Sales agencies.

For cottage industries, institutions such as the Victoria Institute, Egmore, Madras, would appear to be useful.

Exhibitions.

Beyond the information they afford the public I attach little value to these, they should therefore in my opinion be popular [illegible] is in most cases out of all proportion to results.

Government patronage.

It would appear very desirable for Government to publish lists of imported articles and give opportunities to producers and importers to inspect the same and also to purchase commodities, so far as possible, in this country.

Land policy.

I think Government might give a good title by applying the principles of the Land Acquisition Act to land purchased for factory and industrial purposes so long as the land is so used. It is often not difficult to secure a good site by private negotiation, but impossible to acquire a good title and no producer cares to erect buildings or machinery on land of doubtful title.

Training of labour and supervision.

The Buckingham and Carnatic Mills, with Government assistance, have endeavoured to provide elementary education to improve the efficiency and skill of the workmen with a degree of success that has been encouraging and the lines proceeded on are briefly sketched below:—

Day Schools.—For half timers and children of the workpeople:—

Morning Session 7 to 10 a.m.—Number on rolls 388.
Afternoon Session 2 to 4-30 p.m.—Number on rolls 380.

Night School and Technical Classes, for full timers in the mills:—

6-30 to 8 p.m., in hot weather.
6-15 to 7-45 p.m., in cold weather.
Number on rolls—265.

Technical Classes.—Include theory of weaving, sizing and spinning, machine drawing, building construction and practical geometry taught by skilled foremen Average attendance nightly—45.

For half-timers.—There are small practical classes in carpentry, blacksmith work and tailoring from 7 a.m. to 5 p.m., in connection with the Day School under supervision of trained master workers from the Engineering Departments of the mills.

Curriculum.—6 to 7 a.m., Gymnastics with drill instruction in open air gymnasium

7 to 7-25.—All classes at drill and gymnastics under supervision of trained instructor.

7-25 to 7-30 marching in to music, saluting the flag. "God Save the King" sung in assembly.

7-30 to 10 Ordinary School curriculum in classes from Kindergarten to Standard IV.

The following subjects are taught:—

1. Arithmetic.
2. Vernacular (Telugu, Tamil and Hindustani).
3. English (taught conversationally in all the classes; written work from Standard II upwards).
4. Hygiene (Practical work is done in a special Dhoby Khana and there is an open air bath).
5. Gardening (each regular boy has his own plot and each class its own set of gardening tools; there are 660 plots 8 ft. × 4 ft.).
6. General knowledge including geography, history and civics (to the older children).
7. Hand work paper folding, clay modelling and palmyra leaf work in the Kindergarten classes. Carpentry, blacksmith work and tailoring in the upper classes
8. Drawing.

Training of supervising and technical staff.

The institution that appears to be giving the best results, from the Indian manufacturers' standpoint that I know of, is the Victoria Technical Institute in Bombay, regarding which members of the Commission know a great deal more than I do.

Mechanical engineers.

I consider certificates should be uniform as far as is practicable, and that there should be reciprocal recognition of such certificates by Local Governments.

Official organisation.

I think that there should be a Board of Industries with executive powers.

The Board should have a full time and permanent Director and should be generally on the lines of a Port Trust.

The Director should be a member of the Indian Civil Service and also represent Commerce.

The members should so far as practicable be producers, that is to say, manufacturers chemists and engineers.

The first Board should be selected by Government and vacancies be filled by Government, who would doubtless consider the qualifications of producers suggested by the Board.

I suggest a civilian for such an appointment in the hope that when appeals are made to Government Department he would be consulted by Government before rejection of such appeals. A civilian with special knowledge should be in a position to suggest compromises to safeguard Government interests without blocking appeals. In such cases he would not, of course, necessarily consult his Board.

I [illegible] that there should be a Director-General of Industries, as it is most desirable [illegible] of this kind should be co-ordinated, and that each presidency should not [illegible] a water tight compartment.

[illegible]ates of [illegible]ity.

I think that in this Presidency an experiment should be made in indigo with Government certificates of quality. The quality is most variable, and I think Government should try a system of analysis and marking this product. There are other products that might benefit but indigo is the one that appears most in need of standardising at present. I should not make such marking compulsory, and for a period, to introduce the system, the marking should be done free of charge and afterwards, if the experiment succeeds, a fair charge to cover expenses should be made.

Trade marks and trade names.

Registration by the State would appear to be desirable.

Roads, railways and water ways.

I consider all existing waterways should be kept in a state of efficiency regardless of the supposed interests of railways. Low priced commodities, such as fuels of all kinds, and cheap food stuffs, are enormously raised in value to the poor consumer by enforced employment of railways when waterways are allowed to languish as they are doing in this Presidency.

Jail competition.

I have to complain of the Coimbatore Jail directly competing with the Buckingham and Carnatic Mills with their cloth products. The jail products are made by power driven machinery and in no circumstances should power machinery be employed in the manufacture of an article to the prejudice of a manufacturer.

The Coimbatore Jail issues price lists and would appear generally to conduct a wholesale and retail trade in the same way as the ordinary tax paying producer.

eneral.

We have heard a good deal during the last ten years about the want of industrial enterprise in this Presidency and Government, in the abstract, appear genuinely anxious to do something, but in details I think Government Departments are in themselves a stumbling block.

There is no lack of enterprise in my opinion; take for example ginning and rice mills.

Appeals to Government in matters of detail which are constantly arising are hardly ever fairly and squarely met, they are treated, as well as called, "petitions", as if each application was a request for a favour or solicitation for a small personal end. Applications or "petitions" take an enormous time to be considered. In almost every case they are negatived, and appear to the merchant and producer to receive scanty and perfunctory consideration. I do not wish to make a sweeping statement as I have received consistent kindness, advice and assistance from individual members of Government Departments to whom I have gone in person, which I would gratefully acknowledge. But what I, in common with other business men, complain of, is the way that ordinary written official routine applications or appeals are treated, the enormous time wasted in settling issues, the inadequate reasons, if any given, and the curt manner in which applications are frequently dismissed.

We merchants and producers feel that our cases do not receive sympathetic consideration. We feel that in this Presidency owing to the smallness of the unofficial community it is unable to voice its grievances with the strength of similar communities in other parts of India, and in consequence the trade and industry of the Madras Presidency is prejudiced by bureaucracy.

If Government are anxious to develop the resources of Southern India, surely those who have already done something should be encouraged. By assisting existing industries to increase their profits and their powers of production, they will far more rapidly develop the industries of Southern India than by the establishment of isolated pioneer factories. Bluntly, the machinery of Government for dealing with merchants and producers wants speeding up and co-ordinating with its avowed objects before the Government itself should undertake to teach potential producers how to manage industrial enterprises.

V.—Training of labour and supervision.

One of the great difficulties in the development of factory industry in this part of India is the migration of labour. The labourer here dislikes factory life and discipline for prolonged periods.

To try and induce labour to remain longer in the factory, we have at the Buckingham and Carnatic Mills what we call Gratuity funds the rules for which are enclosed. These funds were started in 1904.

It will be observed that the employee contributes nothing, that 5 per cent on his earnings is taken to an account in his name each month, and if the half-year's working of the factory is satisfactory the amount so taken is doubled at the end of each successful half-year. The employee is at liberty to draw the whole amount at the end of 10 years' continuous service and to start again if he so desires.

It took some time for the workpeople to realise the benefits of these funds, but I think that they are now appreciated.

VI.—General official administration and organisation.

My suggestion is that the Director-General of Industries for all India should be distinct from the Member for Commerce, but that one officer in the [illegible]

THE CARNATIC MILL GRATUITY FUND.

I.—FORM OF DECLARATION.

I hereby declare the following to be the name and address of the person who, in the event of my death, will be entitled to receive payment of any amount that may be then standing to my credit in the Carnatic Mill Co.'s Gratuity Fund.

Name.
Address.
Signature.
Two witnesses to signature.
Date.

II.—CONDITIONS.

1. The object of the Fund is to provide a gratuity that will assist or enable the Company's servants, after ten years or more satisfactory service with the Company, to start business of their own, or to enable them to return to their country with some provision for their old age.

2. No operative shall be entitled to the benefit of the Fund who has not signed the Roll of Members relating to same, together with the terms and conditions. Each operative shall, besides signing the roll, sign the declaration contained in this book as to the person entitled in case of the death of the operative to receive any payments to be made under these rules. Such nominee may be varied from time to time at the option of the operative.

3. This book shall be presented by the operative to the Manager of the Mill every month, for the purpose of the necessary entries being made as regards service and salary.

4. The amounts to be entered in this book shall be calculated at 5 per cent on the earnings of the operative in whose name the book is issued, but such amounts shall form no part of the operative's pay, and he shall have no claim against the Company in respect of any sums so entered, until he shall have served the Company continuously and satisfactorily for the full period of ten years from the date entered in this book as being that of the commencement of such service.

5. The Company may, when the working of the Mill in any half-year has been sufficiently satisfactory in their opinion to justify the same, make a special contribution or bonus to this fund in addition to the amount paid under the last preceding clause but the making or withholding of any such special contribution or bonus and the amount thereof shall be in the absolute discretion of the Company.

6. As soon as the operative herein mentioned shall have served the Company for such full consecutive period of ten years and in accordance with the rules hereunder written, the Company will pay to him the aggregate amount of the sums then entered in the account hereto annexed.

7. The Company will also, in case the operative shall receive an injury in the service of the Company that, in the opinion of the Company's Medical Officer, precludes his continuing to work for the Company, pay to him the amount that shall on the date of such injury, be entered in the said account.

8. The Company will also, in the event of the death of the operative at any period after two years' continuous service, pay to his nominee such sum as may be entered in such account up to the time of the death of the operative.

9. After the completion of ten years' continuous service the operative shall be at liberty on production of his book, either to draw the amount then standing to his credit, or to leave the same as a deposit with the Company payable on demand and bearing interest at 4 per cent per annum.

10. From and after the expiration of the said ten years, if the operative shall continue in the service of the Company, the allowance of 5 per cent on the wages of the operative shall be increased to 7½ per cent for the purpose of providing a further bonus which shall become payable to the operative at the expiration of a further continuous service of seven years upon the same conditions as above stated from the date of the expiration of the ten years' continuous service above referred to.

11. Nothing herein contained shall in any way be taken as restricting the powers of the Company or its Manager from at any time dispensing with the services of or dismissing the operative, as provided in any of the rules hereinafter set forth or otherwise howsoever.

12. Nothing herein contained shall in any way affect any contributions by the operative to a separate Provident Fund which may be opened by the operative with the Company.

13. In the event of the operative assigning, mortgaging, charging or purporting to assign or mortgage or in any way charge any interest or rights, present or future, that may arise under the above conditions, such interest or rights shall be forthwith

forfeited and cease and the operative shall have no claim on any account whatsoever under these conditions against the Company.

14. The operative agrees to and accepts the rules for operatives now or hereafter to be in force in the Carnatic Mill Company, Ltd., and in the event of the operative striking work disobeying or contravening any of such rules shall forthwith forfeit any interest or right the operative may have in the gratuity fund.

15. The date from which the service of the operative is to be taken as having commenced under these conditions, for the purpose of credits being made in his account, shall be the first day of the month following that on which he has signed the Gratuity Fund Register.

III.—NOTICE.

All persons employed in this Factory are informed that no person in any capacity whatsoever has any right or authority to offer, ask for, receive or collect any money, loan, bribe, present, reward, photograph, commission or dustoory from any other employee or person for any purpose, or upon any pretext whatsoever either on his own behalf or on behalf of any other person or persons.

Each person employed should understand that the pay earned by him or her is his or her absolute property and intended for the employees' own use and benefit, and that therefore, no employee should be deprived of any part of such pay by loans or by giving it away in the shape of bribes, presents, rewards, photograph, commission or dustoory to any superior or other employee. Should the custom be for employees of higher grades to extort money, presents, loans, rewards, photograph, commission or dustoory from those subordinates to them on the plea of getting the latter employment promotion or other advantage, warning is hereby given to each and all that such custom is in direct contravention of the Company's orders and that the moment it comes to the Company's knowledge that any employee is directly or indirectly concerned in any such malpractice, instant dismissal will follow.

IV.—RULES FOR OPERATIVES.

1. Every operative employed in this Factory shall punctually attend to and commence and cease his work at the respective hours which may from time to time be fixed by the Manager.

2. The opening and closing of the Factory will be signalled by means of a whistle, bell or gong. Operatives employed in the Factory shall enter and leave by the main gate only.

3. Operatives guilty of misconduct will be liable to fine, and all such fines will, on recovery, be credited to the Company's "Gratuity Fund."

4. No operative shall under any circumstances absent himself from the Factory during working hours without leave of the Manager, and (subject to Rule 10) any operative who shall absent himself for eight working days in any one month without such leave shall be considered to have left his employment without notice and shall forfeit all wages due to him. For absence without leave an operative will in addition to his or her pay for the day of his or her absence be fined a sum not exceeding one day's pay.

5. No operative will be employed by the month; but, unless employed on piece-work, shall be employed on fixed daily wages. All operatives, whether employed on daily wages or on piece-work, will be paid their respective wages once in every month. Those who receive fixed daily wages shall be entitled to receive payment only for the number of days they may have worked in such month. Out of the wages payable to every operative employed at the Factory, fifteen days' wages or such proportionate sum as may be fixed for the department in which he or she is employed, may be deducted and kept in arrears as security or guarantee for the proper and faithful discharge of his or her duties and for his or her obedience to all lawful orders, rules and regulations, from time to time in force in that behalf, and the amount of any fine or forfeiture, which any such operative shall have incurred by reason of any breach or infringement of such orders, rules or regulations, may be deducted out of the wages payable to him or her.

6. Any dispute or complaint regarding wages shall be brought to the notice of the Manager immediately after the receipt by, or tender to, the complainant of the slip showing the amount of wages appearing to be payable to him or her, and it shall be the duty of the Manager or the officer appointed in that behalf, to attend to such complaint and adjudicate thereon forthwith. No alteration of amount of wages can be made at or after the time of payment.

7. Operatives desirous of leaving their employment shall give one month's previous notice to the Manager of their intention to leave; such notice must be given on the 1st or 16th of the month subject to Rule 10; every operative who shall leave his employment without having given such notice shall forfeit all arrears of wages then

due to him or her. The Manager may refuse to accept from any operative a notice of his or her intention to leave the Company's service, if such notices are given in such a number, or to take effect, at the same time so as to impede the proper working of the Mill or lead to the stoppage of any of its departments.

8. The Manager on behalf of the Company shall also give one month's previous notice, either on the 1st or 16th of the month, to any operative whose services he may think fit to dispense with, or in default of such notice shall pay to such operative one month's wages in lieu of notice. Provided always, that in case any operative shall misconduct himself, or disobey orders, or in any manner act negligently, incompetently, disorderly, intemperately, or fraudulently, the Manager may dismiss him or her summarily, and the operative so dismissed shall thereupon forfeit all wages earned by him or her. Should any operative refuse to work or do any act, either singly or in combination with other operatives, which may have the effect of stopping any machine or any department of the Mills or of delaying the efficient working of any machine or any department of the Mills he or she shall forfeit to the Company all arrears of wages earned up to the day of such refusal or of doing such act, and shall be dismissed.

9. Wages shall under no circumstances be payable day by day, but shall be payable only on one of the regular pay days.

10. Except in case where the Factory requires to be stopped for more than 30 consecutive days the stoppage of the Factory from whatever cause, shall not entitle any operative employed to be absent without leave. If the Factory requires to be stopped for more than 30 consecutive days, the Manager, on behalf of the Company, shall forthwith give notice to that effect, in which case it shall not be necessary for operatives absenting themselves to obtain the leave required by Rule 4, and, moreover, they shall be entitled to leave the Company's service without notice and to receive their wages up to the time of the stoppage of the Factory.

11. In any suit or action for wages brought against the Company by any operative the Company shall be entitled to set off against the claim in such action or suit, the amount of any fines or forfeitures, which the plaintiff in such action or suit may have incurred under these rules.

12. Any operative in the employ of the Company who shall steal or wilfully injure any property of the Company or shall commit any fraud on the Company, and any such operative who shall aid in or abet the commission of any such offence will be liable to immediate dismissal from the Company's service and shall forfeit all wages earned by him or her up to the day of such dismissal and will also be liable to be prosecuted.

13. Operatives soliciting, enticing, intimidating or conspiring, with other operatives employed in the Factory to leave the service of the Company may be summarily dismissed and shall be liable to forfeit all wages then earned by them and also to be prosecuted.

14. Operatives striking work, or intimidating, or conspiring, with other operatives employed in the Factory, to strike work may be summarily dismissed and shall be liable to forfeit all wages then earned by them and also to be prosecuted.

15. Operatives found taking bribes or loans from, or giving bribes or loans to, other operatives employed in the Factory, or from, or to, any other individual having dealings with the Company, as a motive, or reward, for doing or omitting to do any act, the performance or omission whereof would be prejudicial to the interests of the Company, will be liable to summary dismissal and the forfeiture of all wages.

16. Smoking is strictly prohibited and every operative found smoking, within any part of the Mill premises, shall be dismissed.

17. An interval of half an hour will take place from 12 noon to 12-30 p.m., during which the Engine will stop.

18. A list of holidays allowed under the Factories Act is exhibited separately.

19. No child shall be employed in the Mill under 9 years of age. No child shall be employed for more than 6 hours in any one day. No woman shall be actually employed for more than 10½ hours in any one day.

20. No woman or child is allowed to work in this Mill who is employed in any other Mill or Factory.

21. No woman or child shall clean machinery while in motion.

22. The Engine will stop at 4 p.m., on each Saturday for cleaning machinery.

V.—Savings Fund.

If an operative desires to deposit with the Company the sum at his credit in the Gratuity Fund on completion of 10 years' service, under rule 9, the amount will be transferred to the Savings Fund, and the depositor will be at liberty to draw any portion or the whole of the deposit at any time.

Interest at the rate of 4 per cent per annum will be added at the end of each half-year.

VI.—PRIVILEGE LEAVE.

After completion of 10 years' continuous service operatives are entitled to one week's (i.e., 6 working days) leave per annum on full-pay when their services can be spared by the Manager.

VII.—SCHOOL.

Day School.

The school is intended to teach English, Reading, Writing and Arithmetic to half-timers employed in the Factory.

The children of work-people too young to work in the Factory may also attend the school.

A monthly fee of one anna is charged which is refunded to pupils who do not miss a class.

Attendance is voluntary.

Boys obtaining a IV Standard Certificate, desiring employment on attaining full timers age, in the Dyeing, Mechanic Shop or Warehouse Departments should make an application to the Manager, when their names will be placed on a register for consideration on the first vacancy.

The IV Standard Certificate must be countersigned by the Superintendent of the School.

The rule requiring that boys under 5 feet high shall not be employed in certain departments will be relaxed in favour of boys obtaining a IV Standard Certificate in the Mill School.

Night Classes.

These classes are intended to continue the education of half-timers when they become full timers. A monthly fee of one anna is charged but is refunded to pupils who do not miss a class.

Technical Instruction.

Lectures are given and classes held at night at the Mill Institute on Carding, Spinning, Weaving, Machine Drawing and other subjects connected with the Mill work.

Attendance is voluntary and admission free.

VIII.—DISPENSARY.

1. Sick leave cannot be granted without a certificate from the Company's Medical Officer.

2. In cases of sickness exceeding 3 days continuously, relief will, if possible, be allowed, subject to the employees' previous record being satisfactory to the Manager.

3. Applications for relief must be supported by a certificate from the Company's Medical Officer.

4. The Company's Medical Officer will not grant certificates in cases of sickness which, in his opinion, have been caused by misconduct, or neglect of personal cleanliness

5. Except in cases of accident in the Company's service, which shall receive special consideration, relief will not be paid for a period exceeding three months.

6. Relief payments will only be made on the usual pay days and for the ordinary Factory working days ; no allowance can be made for days on which the Factory is stopped.

7. The Medical Officer's certificates for leave should be taken direct by the patient to the European Officer in charge of applicant's department, and not to a Maistry or Writer.

8. The Medical Officer may be consulted by the families of workpeople during Dispensary hours ; medicine will be provided free, but out-patients should bring their own bottles.

Spectacles.—Half the cost of spectacles will be paid by the Company if recommended by the Medical Officer for operatives whose pay does not exceed Rs. 40 per month.

IX.—CHUTRAM.

The Chutram provides a cooking, eating, resting place and shelter for work-people, with separate accommodation for different religions and castes ; and a sleeping place for single men arriving from up-country until they can select suitable lodgings.

ORAL EVIDENCE, 26TH JANUARY [illegible]

President.—Q. You mention the difficulty of getting the [illegible] to discuss with the Government and Government officials, [illegible] getting anything like satisfactory explanations when the [illegible] carried out. Is it your idea that, if you had a Director of Industries, supported or checked by a Board of Industries with executive powers, questions of that kind would be dealt with more adequately, and enquiries might be shortcircuited?—*A*. I don't think the Board will be able to help direct very much in that way. I thought that if Government, when they found a difficulty, would explain the difficulty from whatever point it is, to the Director, he, knowing the merchants, would be in a position to suggest a compromise both to the merchants and the Government, which might possibly meet the case, instead of a blank refusal without an explanation.

Q. I suppose a Board of that kind should include several merchants?—*A*. It would no doubt stiffen it. I thought perhaps Government might not like always to communicate reasons to the Board, when they would be willing to communicate them to a Civilian Member of their own service.

Q. Have you any idea whether a Board of that kind could be made suitable for dealing with cottage industries, or whether there should be a totally different type of personnel to deal with questions of that kind?—*A*. To do any good you would have to have a Board up-country as well as in Madras, as industrial interests are not likely to be developed in Madras. Development is more likely to come up-country. The Board in order to help Government would probably have necessarily to be in Madras. I don't think a locally conducted Board would be of much use for up-country purposes.

Q. Out of Madras itself what centres would you select for any convenient Board or Boards to give good advice with regard to the development of cottage industries?—*A*. I should select Madura, Calicut, Bezwada.

Q. You would make them into small Local Committees?—*A*. I think so.

Q. And the Director of Industries would be in communication with those Committees?—*A*. I think so.

Hon'ble Sir R. N. Mookerjee.—*Q*. Have you got any Indian mechanics in your mills as foremen?—*A*. Yes.

Q. They are trained by you?—*A*. Some of them; some are from other places.

Q. What education do those boys get before they come to your school? Do they pass any examination?—*A*. We don't subject them to any examination.

Q. But they are supposed to know elementary mathematics and drawing?—*A*. Well, it all depends. Some of them start on Rs. 25, some 50, some 75. It just depends on their qualifications and the vacancies.

Q. You have not got any Indian mistri trained there who is capable of taking charge of a section as supervisor?—*A*. We have got engineers who are capable, Bombay men, but very few Madras men. We have got men up to Rs. 250 a month as assistant foremen, Indians. They have had their training elsewhere.

Q. Generally speaking, the men of the artisan class whom you have got, know to read and write?—*A*. Yes. But they are not Madras men unfortunately, and do not know the Madras language. The best men are from Bombay, in the way of assistant foremen.

Q. These lectures are given in the Madras vernacular?—*A*. Yes, as far as possible, but we sometimes have to do a certain amount of translation work. If it is a Bombay foreman lecturing, he has got to have it translated.

Q. Do you take outside apprentices?—*A*. Only for the six months' course of the Victoria Institute at Bombay. The mills submit a weekly report.

Q. On a certain arrangement?—*A*. No, the boys come to us and ask to do their six months' course. We allow them and give them certificates.

Q. Have they got a boarding house?—*A*. I don't know where they go. We give them a small salary to keep them on our books, Rs. 10 a month, as we do not like them to feel that they can come and go as they like.

President.—*Q*. Are they Madrasis?—*A*. Yes.

Q. They really come home to study?—*A*. Yes, to do their practical course.

Q. Do they bring a regular form to fill up?—*A*. They bring a form from the Victoria Institute.

Q. Together with a letter showing who they are?—*A*. Yes, sometimes Mr. Dawson asks us to take a boy in but generally they come by themselves.

Hon'ble Sir R. N. Mookerjee.—*Q*. And you give them certificates when they go?—*A*. The Chief Engineer might; I am not sure about that.

Q. But when they return to the Victoria Institute they must take some sort of certificate with them?—*A*. They get a return every week showing what they have done. They are passed on from one department to another and get a weekly sheet.

Q. How many come at a time?—*A*. Not more than three or four. I don't want you to take that as final. I will get you the figures if you want them.

Q. You have no objection if any one comes from Bengal or up-country?—*A*. No [illegible] all.

President.—*Q.* Has this system been going on long enough to give the history of one of these men?—*A.* No, I don't know the history. I don't think any have come back after they have finished; if so, only one or two. We hope to get them back some day.

Q. Are these boys from the Victoria Technical Institute who get good certificates from the school able to get places always?—*A.* We have a number of them; but they are Bombay men; perhaps 8 or 9 have been recommended by Mr. Dawson. We ask him for men who have done practical work.

Q. You are very favourably impressed with the class of training given in that institute?—*A.* Yes, he sends us very good men. I have not seen the institute or know anything about it, except from the men I have seen.

Dr. E. Hopkinson.—*Q.* You consider that the Board of Industries should have executive power. What do you think should be the relations between the Director of Industries and the Board?—*A.* Very much on the lines that the Port Trust is run on here. We have all got a vote and say in matters.

Q. And the Director becomes the Executive Officer of the Board?—*A.* Yes.

Q. Should the Director have a vote on the Board?—*A.* Yes, and a casting vote in case of equality.

Q. But no veto?—*A.* I don't think so. I don't think it much good having these vetoes and official majorities.

Q. Do you suggest that they should have budgetted funds?—*A.* I think so. I don't see how you are going to manage without; we would not get anything.

Q. And the funds, as budgetted, should be under the control of the Executive Board?—*A.* Yes.

Q. And you consider that the Board should be composed, as far as possible of producers—manufacturers?—*A.* Yes.

Q. Do you include agricultural producers in the term?—*A.* Agricultural too, I should say, as distinguished from commission merchants.

Q. You say that the Director of Industries should be a Civil Servant?—*A.* I explained my reasons to the Chairman. It is simply to help to get things through with Government. He would have more influence with the Government. There are very few non-official people who are able to do anything. The ordinary outsider does not get very far.

Q. Do you think that the advantages would be commensurate with the disadvantage of the Civil Servant not being what is ordinarily termed a business man?—*A.* That is hard to say.

Q. You would agree that there are two considerations?—*A.* There are undoubtedly. If you can get the right man in the right place I don't care who he is.

Q. Probably that is the best solution of the difficulty?—*A.* Yes, I have only given you my reasons for suggesting a Civil Servant.

President.—*Q.* I would like to know if you could give us three or four concrete illustrations of what this Board might do, what kind of problems would come before it, and in what way these problems will be settled. Perhaps you would like to think over it?—*A.* Certainly.*

Hon'ble Sir R. N. Mookerjee—*Q* Supposing the Board decided to help industries by giving a loan or guarantee, how can you budget for that in anticipation. The Government of Madras, or the Government of India would not allow you to budget a lump sum to be spent in anticipation of certain projects?—*A.* It would be subject to their approval.

Q. Then it cannot be a budgetted fund?—*A.* They could provide so much and then explain to Government how they were going to use it. We would not get anything otherwise.

Q. May I take it that you mean an average budget for every year?—*A.* Every case beyond a certain expenditure might go to Government. Any amount you require above a certain limit should certainly be submitted to Government for fresh orders.

Dr. E. Hopkinson.—*Q.* In reference to certificates of quality, you instance indigo as a case where a Government system of classification would be advantageous. Is it not a fact that one great objection to natural indigo is its variable quality?—*A.* Yes, but we have it varying from ½ per cent to 58, 60 and 65 per cent. It is too much.

Q. But I take it that there is an inherent difficulty in getting natural indigo of anything like consistent quality?—*A.* I have myself seen clay soaked in aniline blue sold as indigo.

Q. That might possibly be, but what I want to get at is this ; you put this matter forward as the subject of research, that Government ought to take measures to institute research into the means of getting natural indigo more regular in quality. I was not quite sure whether you put it forward as a scientific investigation which ought to be undertaken, or merely as a police measure?—*A.* I don't like commercial legislation for adulteration, but I do believe in a system of certificates. It would be found useful in a number of instances if the certificate system took on. It ought to be a great advantage to buyer and seller. It is done in other parts of the world, and it is done at home.

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* Vide additional written evidence printed after oral evidence.

Q. You think there would be no difficulty in the particular case of indigo?—*A.* I am not intimately acquainted with indigo manufacture, but I should say it is a case that offers a very good chance of being successful.

Q. In regard to jail industries, may we take it that you would penalise jail industries or jail production by disallowing the use of mechanical power?—*A.* Yes, for what is sold to the public.

Q. And you would do that as a measure of penalisation?—*A.* If you like to call it that.

No doubt that is one way of doing it ; it is absolutely direct.

President.—*Q.* I take it that you object to the introduction of mechanical power in jails?—*A.* For goods competing with commercial interests.

Q. Whatever there is in the matter of punishment can be accomplished without the introduction of power?—*A.* Exactly.

Dr. E. Hopkinson.—*Q.* Is your system of deposits in the Gratuity Fund now widely adopted by work people?—*A.* Yes, practically all of them, except the boys. We don't ask the half-timers to join in They change too much.

Q. Then it becomes quite a big matter for the firm?—*A.* Yes, I have got the figures here. The balance at credit of the Gratuity Fund at the end of December is Rs. 1,29,720.

Q. Invested against that in Government Paper to meet liabilities as they arise is Rs. 94,000?—*A.* That is only a contingent liability on their completing ten years' service.

Q. And the whole of that is contributed by the mills?—*A.* Yes, and all fines and unclaimed wages and forfeitures are taken into that. We make a contribution each half year, and the rest is compound interest and forfeitures. Nothing is contributed by the work people except the wages they leave behind.

Hon'ble Sir R. N. Mookerjee.—*Q.* With reference to this Trust, is this fund managed by any of the subscribers themselves?—*A.* No, it is absolutely managed by us.

Q. The employees have no voice in regard to the investment of the money?—*A.* It is all in Government paper.

Q. They have no trustees among themselves?—*A.* No, they contribute nothing at all. We credit them with 5 per cent calculated on their monthly wages and if the mill pays 10 per cent dividend, we double the amount at the end of the half year.

Q. And those on the foremen list get the same advantage like the officials?—*A.* We have a separate fund for the officers. They subscribe, but we manage it all for them.

Dr. E Hopkinson.—*Q.* With regard to the school you have established, when did you first start this school?—*A.* About 1904.

Q. And I suppose the particular system you have now has been a process of evolution?—*A.* Yes, we started in a very small room with a few boys.

Q. Have the boys that now come to you had any primary education at all?—*A.* Very few of them. You may say they have had none, for all practical purposes.

Q. Do you make attendance at school compulsory?—*A.* No.

Q. What proportion of the boys attend?—*A.* About seven or eight hundred out of 1,600.

Q. Do you find that there is a distinct difference in the quality of the work done by those who have attended the school and those who have not?—*A.* It is rather hard to differentiate in the work. There is a difference in the appearance of the boys. Anybody visiting the school will see that for themselves ; they are cleaner and tidier.

Hon'ble Sir R. N. Mookerjee.—*Q.* If you make that education compulsory, do you think it would affect your labour?—*A.* I don't think it should be made compulsory. I don't see how any firm is going to start business if the thing is made compulsory.

Q. If it is made do you think it would affect your labour?—*A.* I don't know at all, but I am very strongly against it being made compulsory. I think it should be encouraged but don't think that any firm starting a new company can afford to do what we have done. They can do it afterwards when they get established. You have got to get some money in hand and get your business established before you give your [illegible] thought and money to these other considerations. I don't think it is possible to do everything at once.

Dr. E. Hopkinson.—*Q.* Has any record been kept of the expenditure on these [illegible]—*A.* Yes, we have a record.

Q. Have you any objection to put in a statement of the expenditure incurred?—*A*. What is the object, may I ask?

Q. Our principal object is that we would like to know what the cost of such work is?—*A*. I am quite willing to give it to the Chairman, but I don't think I want it published by the press.

(*Witness subsequently communicated the cost of the schools which is confidential.*)

Q. You have asked no assistance from Government at all?—*A*. Oh, yes ; we get assistance from Government. Originally we asked for assistance as a check on the work of the school, and we have kept it up ever since. We find the inspections useful, as the Government have taken an interest in it.

Q. Merely in the form of inspection?—*A*. No, they give us Rs. 3,000 a year and of course we have the advantage of their inspection and suggestions.

Q. Is that a lump sum contribution?—*A*. Yes based on certain returns we give. I don't know how it is arrived at.

Q. A grant-in-aid?—*A*. Yes.

Q. Do you get any advice, which is of value, from the Government?—*A*. From the Inspector? Yes, some of it is valuable, some is not, but we are very glad to have it. The Principals of the schools are quite pleased to have it ; they don't agree with everything of course.

Q. Have you found difficulty in getting competent teachers?—*A*. Now we are on another subject ; you mean the technical classes? Yes, that is the great difficulty. The people we get are not trained to teach. They cannot teach ; they assume knowledge on the part of the pupil which he has not got, and get impatient with them. They are our own staff which we pay for coming in at night. They are trained workmen but not trained teachers and they are very inefficient teachers in that respect.

Q. I suppose you can sort them out to a certain extent, and in time can tell which are good teachers?—*A*. Yes, the Principals of the schools attend to that. That is their only work looking after the teachers in the day and night schools. They are not expected to teach themselves.

Q. Who are the Principals?—*A*. There are two ladies, one is an M.A. and the other is a Kindergarten specialist. They both came out together They came from Constantinople from the English college there.

Q. Some of the teachers are British and some Indian?—*A*. All the teachers are Indian. The British foremen come in and examine the work that has been done at the end of six months, whenever the Principals ask them. They also come in now and again and watch what is being taught.

Q. Have you any regular system of examination at the end of the year?—*A*. About every six months they examine them by getting a European in from the mill. We always find some European who takes an interest in the particular classes that are going on.

Q. But the examinations are more or less casual?—*A*. Yes, just to see what has been done.

Q. They are different from ordinary school examinations?—*A*. Yes, they are quite informal.

Q. Supposing it conceivable that a general system of primary education involving manual training was introduced throughout India, do you think that such a curriculum which you have sketched out here would be feasible?—*A*. I don't know. I can only tell you what we have done. I have not much time to study what is going on in other educational work. It is working all right with us. I believe Sir Thomas Holland said that we are trying to teach far too much.

Q. And the chief difficulty—so far as you have met with difficulties—has been that of incompetent teachers?—*A*. For the technical classes only.

Q. You think, in the absence of any system of primary education involving manual training, that the most practical steps towards making any educational advance would be to induce employers of labour generally to follow in your steps?—*A*. I think so. I think it improves the relations between capital and labour, and it helps the boys to understand what is said to them.

Q. You find the boy who has been through the school more likely to stay with you?—*A*. I think so ; yes. We think they are more intelligent.

Mr. A. Chatterton.—*Q*. You stated in your evidence that demonstration factories, as defined in the list of questions, seem to be unnecessary and undesirable. Do you think that would apply to demonstration factories which might be erected in the mufassal in various places, to introduce new and more efficient methods of working up agricultural produce, so as to bring it from the field to the market. Take, for instance, these small jaggery plants which have been put up, and also certain types of rice mills?—*A*. No, I don't see any objection to them

Q. You would only apply this remark to factories on a big scale?—*A.* Yes, that was my idea. I don't think anyone objects to trying to introduce new methods of agriculture or anything else, but what I am objecting to is Government projects to compete with existing factories.

Q. In regard to Government pioneering work, you say that it should only be resorted to in case of an entirely new industry, and that it should be handed over to private enterprise at the very earliest possible moment ; but isn't it possible that in many cases it is desirable to carry on the work a stage beyond what you are contemplating. A Government pioneer factory might be working for considerable time after it was profitable, not so much from the object of making profits, but to develop the industry to the utmost extent possible?—*A.* Then your experiment would not be complete. I have no objection to your carrying it on to the completion of your experiment.

Q. What is the object of the experiment? Simply to demonstrate that a pioneer industry would pay 5 per cent on its capital, or to develop an industry and bring it up to its full capacity?—*A.* My stand is entirely one of competition ; if you are competing with somebody else who is taking up that industry, I say it should be closed.

Q. Assuming that it is a new industry, and Government pioneer it to a point that private enterprise comes along and says that this is good enough to put money into and private factories are started, while the Government factory is still running ; because private factories are started, would you at once shut up the Government factory?—*A.* I should say so. As soon as you have demonstrated the project as a commercial success, I think it ought to cease.

Q. You have promised that you would supply us with some examples of the sort of work that you contemplate could be done by the Director of Industries and by the Executive Board.* I presume that you contemplate that the Department of Industries should be something different from the existing Department of Industries?—*A.* Yes.

Q. You suggest also that there should be Boards up-country. Do you think it would be advisable to have a local Board of Industries at the headquarters of the district presided over possibly by the Collector of the district?—*A.* I really cannot give an opinion like that. I am only giving you a general opinion that there is much more scope up-country than in Madras, and that Madras should not be allowed to veto things up-country. I don't quite know how the machinery is to be worked, and have really not thought about it, and have not enough up-country experience to know to what extent it is practicable.

Q. Do you know anything about the Mechanical Engineering School which Government contemplated starting?—*A.* I have not heard anything of it since you left.

Q. When that is started would you be able to send, or would it be worth your while to send apprentices from the mill in the afternoons or evenings to the classes there, in place of the technical classes that you have got at the present moment, as these classes would be conducted by properly trained teachers?—*A.* We will be very glad to give them any encouragement we could. I cannot promise that the men would go after a day's work, if it is far from their homes.

Q. Would it be practicable in the case of the cotton mills to let a number of them go for two or three afternoons?—*A.* I am afraid it would interfere with the work. Our system helps the men who want to get on and not the men who want to get off work for an hour or two. For two or three years I would rather provide the class rooms and have the teachers come to us, and pay something towards it. It would have more chance to succeed in that way.

Q. That is, as far as I know, quite a different idea altogether from having a practical itinerant teacher going from workshop to workshop?—*A.* I think it would work better in our case. The men are tired, they have done a long day's work, and you might or might not get them to go out of Perambur.

Q. You would like to have a Government teacher in mechanics or elementary science come to the mill premises in the evenings from 6-30 to 8, so many nights a week?—*A.* Yes.

Q. And we could have three or four lectures in different subjects, and possibly other firms might make similar arrangements?—*A.* Yes, and if Government participated, there would be no objection to any outsiders coming and joining in those classes.

Q. You think that the Bombay Victoria Jubilee Technical Institute is turning out a very good class of mechanic?—*A.* After he has had practical training.

Q. Do you think it would be a good thing to have a similar institution of that kind over here?—*A.* I think it would be a good thing to have a small one here, to see what scope there is for it.

Mr. C. E. Low.—*Q.* Do these Victoria Technical Institute improvers, or whatever you call them, keep factory hours?—*A.* Yes, they come at six in the morning though they don't work 11½ hours like the rest of the mill workers They get a longer time off for their meals. They keep factory hours in regard to starting time.

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* *Vide* Additional written evidence printed after oral evidence.

Q. Are they at all sticky about it?—*A.* No, we find no trouble with that class of men It is the men trained in engineering colleges that won't come.

Q. Where a school is turning out products similar to those competing with those made by private concerns, the difficulty might be got over by Government making over those products for sale to the concern with which it is competing?—*A.* I don't think that would suit me. I don't know about other people.

Q. You think it is not practicable?—*A.* No, I think not.

Q. Do you believe in compulsory certificates for engineers in charge of prime-movers?—*A* No.

Q. I don't quite understand what you mean when you say "I consider certificates should be uniform as far as is practicable, and that there should be reciprocal recognition of such certificates by Local Governments"?—*A.* That is just in answer to the question whether they should be interchangeable. I don't think with prime-movers. We have got experience of the factories in the Bombay and Madras Presidencies. We get better men in our own presidency for less than half the pay. I am alluding to the third class certificated men.

Q. I suppose, with reference to first and second class men, there is no difficulty?—*A.* All our first and second class are certificated. I am only speaking of the small ginning factories up-country We get better men for half the money. It is only trade unionism.

Q. Have you any views on the subject of the Government Commercial Intelligence Department, from your own point of view; is there anything that you would like them to do for you?—*A* Not that I know of.

Hon'ble Pandit M. M. Malaviya.—*Q.* How long has the Buckingham Mill been in existence?—*A.* About 40 years roughly,

Q. Has it been a paying concern from the beginning?—*A.* It has had ups and downs. It paid very well at the beginning.

Q. How long has it been established as a successful business, paying a fair dividend? How much have you paid in the last ten or twelve years?—*A.* It paid 10 per cent for the first ten or fifteen years. Then we had bad times.

Q. And now, during the last ten or fifteen years?—*A.* It has done very well.

Q. You have got among your shareholders both Indians and Europeans?—*A.* Yes.

Q. What portion of the capital would be Indian?—*A.* (In answer, witness handed a list of the shareholders to the Hon'ble Pandit).

Q. You have two Indian directors on your staff?—*A.* Yes.

Q. Do you find the interest of Indians in this kind of business growing?—*A.* I don't know. I have not noticed much difference. We have always had Indian directors.

Q. You export a great deal of cotton out of Madras, don't you?—*A.* We don't export; the presidency exports cotton.

Q. Can you tell us any reason why there is not more enterprise in the way of cotton manufactures here?—*A.* No, I cannot tell you.

Q. You cannot think of any causes that have been standing in the way of developing this enterprise. Having your example before them, the example of your success, was it not to be expected that there would be more mills established in the Madras Presidency to weave cotton cloths?—*A.* I should think Bombay competition keeps it down.

Q. But it does not affect you?—*A* Oh, yes; we compete with Bombay.

Q. The goods that you make are only partly absorbed in this presidency?—*A.* They go all over India and Burma and the Straits Settlements.

Mr. C. E. Low.—*Q.* Do you import any long staple cotton?—*A.* No, only American cotton, when we can land it here below 6*d.*

Hon'ble Pandit M. M. Malaviya.—*Q.* Judging from your experience of this business, do you think there is room for expansion in this presidency of cotton manufacturing mills?—*A.* We are extending our own mills now. I admit that much.

Q. You say the conditions for raising capital for establishing industries are not more difficult here than elsewhere, yet I see that the proportion of shares taken up by Indians is only one-fifth of the shareholders and only one-tenth of the shares. That does not show any keen desire on the part of Indians to invest their money in this enterprise?—*A.* No, because these shares are rather big units. If we were starting a new mill we would have smaller shares, and it would be more likely that Indians would come in. The one-thousand rupee shares in the Buckingham is rather too much.

Q. Do you think it will be in the interests of indigenous industries to make special efforts to get Indians to take up shares in any new company you might form?—*A.* If we were starting a new company we would be very glad for Indians or anyone to come in.

Q. Not Americans or Japanese?—*A.* I don't see why we should keep anyone out.

Q. Do you think it would be desirable to let Americans, Japanese and other foreign peoples come in?—*A.* We would let anybody in but Germans.

Q. But when you make your peace with the Germans, would you let them also come in?—*A.* It depends upon the terms of peace.

Q. Whether it is Germany or America or Japan, looking upon it from the point of view of indigenous industries, don't you think the Britisher and the Indian should combine to build up enterprises and not leave much room for other foreigners to come in?—*A.* As long as we get the money, it doesn't matter whose money it is.

Q. But you don't want them to take up the management of the business?—*A.* The business ought to be in the most efficient hands, whether they are Americans or English or Japanese.

Q. But employed as employees, not masters of the concern; would you let them be masters of the concern?—*A.* They could only become masters by acquiring shares. Do you want to legislate that foreigners should not become shareholders?

Q. No, by co-operation between Britishers and Indians?—*A.* I don't think that is quite practicable.

Q. In that case you cannot prevent Americans or Japanese or other people coming and starting business in this country?—*A.* I don't see how you are going to prevent it while we are running on free-trade principles.

Q. You say that the industrial development of the country by private enterprise should be encouraged to the utmost. You surely don't contemplate that Government should encourage private enterprise outside, i.e., among non-British subjects in India?—*A.* I had not that in mind at all. I assume that the object is to encourage the industries of India, and the people of India to develop those industries.

Q. With regard to demonstration factories, you say that it will be undesirable to have them. But where a particular kind of business is not being done in the most efficient way, or the most efficient machinery is not being used, would it not be advisable in the present state of industrial progress among the people that Government should start demonstration factories?—*A.* And wipe out the man who has been struggling to do it on his own account?

Q. You must consider the interest of the industry as a whole, and not of the particular individual. It is not intended that a particular individual should be hurt, but that certain industries should be promoted?—*A.* Who is a fair judge of that? You don't think it is quite fair when Government annexes your land or houses. Is it quite fair to annex an industry?

Q. Will you make an exception in the case of oil pressing?—*A.* Oil pressing happens to be the enterprise in which my firm has lost money. I don't believe in large oil presses but in comparatively small ventures to begin with.

Q. If Government advised that it should be tried as an experiment, you see no objection to that?—*A.* I think it would be a very great mistake. I think it should be a small one, speaking from my own practical experience.

On the other hand, in the Central Provinces, several witnesses advocated the establishment of central factories which would show them how it was done.

President.—*A.* For refining oil, not pressing.

Witness.—*A.* I can only tell you what has happened to ourselves.

Hon'ble Pandit M. M. Malaviya.—*Q.* You suggest that Government should give assistance in advising and giving information about suitable sites for industrial enterprises and assistance in acquiring such sites. Would you not expand it and suggest that there should be a bureau of information to give information about raw materials and machinery, and possible markets?—*A.* If they can, I have no objection.

Q. Don't you think that would encourage enterprise in the province?—*A.* If it can be done.

Q. What assistance do the Government give you in the matter of the education that you impart?—*A.* I think I told you, Rs. 3,000 a year.

Q. With reference to your objection concerning the competition of jail products, does it really operate against private enterprise? Is there not sufficient market for all the products that can be put into the market by jail industry as well as by other private enterprise?—*A.* It is on the question of principle that I object to the competition, as they are able to supply articles at a lower rate than we can.

Q. Is that your only objection?—*A.* That is the practical objection.

Q. Suppose that were got over by some arrangement?—*A.* These arrangements are not fair. We have heard of them. There is the excise duty which they are supposed to add on. It is a transfer entry and amounts to nothing.

Q. Jail industries using power machinery are intended to help the men who are unfortunately passing their time in jail to become efficient workmen when they have finished their period of punishment, so that they may find employment in the mills.

You do expect them to come out better than when they entered, particularly if they have been taught a trade to enable them to earn an honest living?—*A*. I would rather not pursue that.

Q. You write that in details Government departments are in themselves stumbling blocks to industrial enterprise. Is that the result of what you have noticed in this presidency? Have you any particular instances to support that view?—*A*. Mr. Jones brought some instances before you the other day in connection with the Tramways and Electric Supply Company.

Q. Mistakes may occur in any particular department, but has not the Department of Industries in this province been helping in promoting enterprise generally?—*A*. I don't know..

Q. We have heard a good deal of the Department of Industry in this province, and that is why I want to know your opinion Do you think that if the department is well organised, it would be found to be not a stumbling block but a great help in promoting industries?—*A*. I don't suggest that it is a stumbling block. I was not referring to the Department of Industries. The Department of Industries has helped us in well-boring and various things.

Q. You say, "We have heard a good deal during the last ten years about the want of industrial enterprise in this presidency, and Government, in the abstract, appear genuinely anxious to do something, but in details I think Government departments are in themselves a stumbling block." You don't refer to the Department of Industries?—*A*. Not a bit ; certainly not.

Q. What is your suggestion then ; what do you want to be done?—*A*. I am referring to those examples for instance, which Mr. Jones put before you in considerable detail the other day.

Q. You say "There is no lack of enterprise in this presidency" and you instance the case of ginning and rice mills. But there is much enterprise beyond these industries the usefulness of which has been demonstrated to you?—*A*. I am in Madras and don't go up-country much. I know those industries just named. They certainly have developed rapidly. There were very few when I came out, and now there are a great many of them.

Q. In view of the raw materials that you export, isn't the lack of enterprise in regard to manufacture rather obvious?—*A*. I don't think so.

Q. Excepting these two mills of yours, there is no other large mill?—*A*. There is another large mill in Madras.

Q. That is all so far as cotton is concerned?—*A*. There is only one ; one was closed about a year ago.

Q. You say, "We feel that in this presidency, owing to the smallness of the unofficial community it is unable to voice its grievances with the strength of similar communities in other parts of India, and in consequence the trade and industry of the Madras Presidency is prejudiced by bureaucracy." In what way?—*A*. In the matter of these appeals not being sympathetically dealt with.

Q. Has that been the attitude of the bureaucracy throughout ; is it due to want of policy in assisting enterprise?—*A*. I don't know what it is due to, but I don't think they are as helpful as they might be, although Government as a whole are anxious to help industries ; but when it comes to dealing with individual appeals, we don't get much help.

Q. You suggest that Government would far more rapidly develop the industries of Southern India by assisting existing industries to increase their profits and their powers of production than by the establishment of isolated pioneer factories. Don't you think there is room for both courses in this presidency?—*A*. But I want them to begin with us who are here.

Q. But you don't want them to stop there?—*A*. Not necessarily.

Q. You say that one of the great difficulties in the development of the factory industry in this part of India is the migration of labour. The labour here dislikes factory life and discipline for prolonged periods. Do you think if the family system of employment was introduced, this would visibly affect migration, i.e., if you employed workmen with their wives and children?—*A*. I don't think it is possible in a disciplined factory without very great danger. We do not allow any children in the factory at all. They are strictly prohibited.

Q. But we saw groups of children in the mills in Calcutta?—*A*. You won't [illegible] one child in a Madras factory. I think it is very dangerous.

Q. You might turn your enquiries somewhat in that direction. This [illegible] labour not being willing to stay might be solved by employing the family. [illegible] will have no inducements to run away ; the temptation will [illegible] answer).

Q. You say "It will be observed that the employee contributes nothing; that 5 per cent on his earnings is taken to an account in his name each month, and if the half-years working of the factory is satisfactory, the amount so taken is doubled at the end of each successful half-year." Is that in addition to his salary?—*A.* Yes, it is calculated on his salary.

Q. You won't let him withdraw the amount at any time within ten years?—*A.* Not until ten years service is completed.

Q. Don't you think that if primary education were made compulsory, or at any rate universal, you will be saved the necessity of looking after the education of these children in your factory?—*A.* I suppose we would.

Q. In other advanced communities education is provided generally, and so business men are left to attend to their business alone. It would be an advantage to business if this part of the work was done by the State as elsewhere?—*A.* I am not prepared to say that.

Q. You think that this provision of education does not act as an additional drag upon your time and attention?—*A.* We think it pays us in some shape or other. We are not philanthropists.

Q. You say education should not be made compulsory; that applies to the present state of things. But suppose it was made compulsory generally, then you would not object to its being made compulsory for factory children too?—*A.* I don't think I would have any say in the matter.

Sir F. H. Stewart.—*Q.* Are your interests mostly in Madras or all over the presidency?—*A.* Mostly in Madras. We have businesses all over the presidency. We buy cotton all over the presidency We have cotton presses and a certain amount of ginning up-country.

Q. Have you much knowledge of mill labour conditions in other parts of India?—*A.* No, I am very ignorant about it.

Q. How do you recruit your labour here?—*A.* It just comes direct. We have no system of sirdars. It just comes to the door and is taken if wanted.

Mr. C. E. Low.—*Q,* Is that the case with most textile concerns in this presidency as far as you know?—*A* I cannot speak for other people. As far as I know it is the same, but I would not like to answer.

Sir F. H. Stewart.—*Q.* Your labour is pretty near its home here?—*A.* No, a lot of it comes from Nellore It migrates very much.

Q. In Bengal it goes off in certain seasons. Is that so here too?—*A.* It does that to some extent. The resignations are much heavier in the harvest season. It also goes away for a year or two years and comes back again.

Q. It does not go away for week ends?—*A.* Yes, we have heavy absentees up to 15 per cent sometimes a day.

Q. These schools and classes which you have started, are they fairly recent?—*A.* We began in a very small way in 1904, and were in the mill compound. We moved out when the Factory Commission recommended it. We took up two old houses, outgrew them, and built up two new buildings. I wrote down this week to both mills, and the foremen out there say that the labour is gradually staying longer during the last six or seven years.

Q. And it is also likely to induce your labour to stay with you rather than go to other employers?—*A.* I think we get the pick of the labour.

Q. With reference to your remarks about the proposed Director of Industries and the Board of Industries, I should like to know if I have got your idea rightly. I rather gathered you think that there should be a Director who would have a Board with executive powers for Madras, and that for smaller cottage industries and so on, and up-country industries, he should be assisted by local Committees?—*A.* Yes, that is rather my idea, because the Advisory Board in Madras would not be able to travel about like the Executive officers could.

Q. Do you suppose that you would get prominent business men to serve on such Advisory Board, would they be willing to give the time?—*A.* I think so.

Q. You would give the Board fairly full local powers?—*A.* Yes, I would.

Q. Then your Director of Industries whom you suggest below?—*A.* That is only for questions of appeal, to prevent one industry going and injuring another.

Q. But he would not have power to interfere with the executive activities of the Provincial Board?—*A.* He would have some one to appeal to.

Q. You say that he should be distinct from the Member for Commerce, would he be under him?—*A.* I don't know. I think he would be better separate.

Q. You think that the Board should approximate more or less to the lines of the [illegible] I don't quite know how your Port Trust here is composed?—*A.* It is [illegible] the Chambers of Commerce, the Trades and the Government [illegible] Government nominees are there?—*A.* About four.

Q. The Chairman is a Government official?—*A*. Yes. We [illegible] much as they do. I don't see much object in the Chamber of Commerce [illegible] the men for an Industrial Board because there are such a lot of subjects [illegible] in which the ordinary merchant is not qualified to deal with.

Q. Your Chairman is executive head of the Port Trust?—*A*. Yes.

Q. In Calcutta there is the Chairman who is an official, the Vice-Chairman who is not an official and is executive head?—*A*. We have not got that here.

Q. Then you recommend that the Director of Industries should be a Member of the Indian Civil Service. Aren't you thereby bringing in another member of the bureaucracy as you complain a little later on?—*A*. I have tried to explain that I think that appeals are very often dismissed for reasons which we people don't know anything about; possibly because they are not put in the right form, and that a civilian would have some chance to bridge over the difficulties that exist. It is on that account I think he would be a better man.

Q. You mean that he must be familiar with Government procedure?—*A*. Yes, he would be more likely to help along than an outsider who had not the ear of Government.

Q. With reference to your suggestion that certificates of quality might perhaps be given for indigo, where would they come in; would the producer get them and hand them on?—*A*. Yes, with his indigo to the buyer.

Q. It would not be a question of the exporter getting them?—*A*. Oh, no; they all come in at the factory.

Q. Then you refer to the neglect of waterways in this presidency; is there any Waterways Committee that you know of?—*A*. Not that I know of.

Q. Has your Chamber of Commerce any sub-committee which deals with waterways?—*A*. No, they appealed to Government several times to have the canal kept up, but I don't think anything has been done.

Q. About jail manufactures, is your complaint a matter of principle?—*A*. At present it is a matter of principle, because Government is taking all that we can make.

Q. Would jail manufactures in the aggregate interfere with your business?—*A*. We have had them imitate our trade marks even!

Q. Do jail manufactures pay 3½ per cent duty?—*A*. They don't actually pay it. Government say they take it into account; a sort of book entry.

Q. In this respect of jail competition, you refer to certain grievances you have got in this presidency; do you really think you are worse off in this presidency than in others?—*A*. I don't know, but we are a very small commercial community here compared with Calcutta.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. You say "The employee is at liberty to draw the whole amount at the end of ten years continuous service and to start again if he so desires." What is continuous service; do you give them any leave to go to their villages?—*A*. Yes, any leave that is given them does not count.

Q. Do they take any leave?—*A* They can get leave on a doctor's certificate up to three months. They can get casual leave. It is at the discretion of the manager.

Q. But you think they do need a change in this country?—*A*. Yes, we give them leave. If we give them leave that does not prejudice their service.

Q. When you are short of labour, how do you recruit it?—*A*. They come. Each jobber is paid on piece work, and he may go out and look for men himself, but we have no systematic recruitment

Q. Is your labour addicted to drink as in Bombay?—*A*. Yes.

Q. Have you any liquor shops near your premises?—*A*. Government has [illegible] to close them within three furlongs.

Q. Have you had any strikes?—*A*. We have had strikes, but not within the last fifteen years

Hon'ble Sir R. N. Mookerjee.—*Q*. I heard you say, in answer to [illegible] that one-tenth of the total subscribers were Indians?—*A*. The [illegible] to the shares of the two mills.

Q. I see from your directors' list that out of five directors [illegible] You are very [illegible]?—*A*. Indians are very useful directors.

[illegible]

ADDITIONAL WRITTEN EVIDENCE.

(Submitted after oral examination.)

You asked me yesterday to explain why I recommended a Committee or Trust to assist a Director of Industries.

I have tried to put myself in the place of such a Director and find that it would in effect be the position I occupy in relation to the Buckingham and Carnatic Mills.

When in doubt or difficulty about a proposition, I find the best course is to consult a Committee selected from the officers of the mills. I put my trouble before them stating all sides as I see them, and await their report. They have never let me down. Some of the cases dealt with approaching the question in hand were:—

1. Increase of power. To decide whether we should employ steam, oil or gas.
2. In what cases we could employ electricity with advantage.
3. Whether we would make our own sulphuric acid, sulphate of iron, etc.
4. Whether we should go in for cotton cloth printing.

As to the composition of the Committees, I have four classes to choose from:—

1. Chemists.
2. Engineers.
3. Textile technical men.
4. Accountants, store-keepers and warehouse packing masters.

I select the three men I consider best and give leave to add to their number, so that they can choose any one else they think may be useful.

I would like to leave this point for a minute, and say that I have watched, entirely as an outsider and with no inner knowledge, the three departments in Madras that are working at industries in one form or another:—

1. Director of Agriculture.
2. Director of Industries.
3. Director of Fisheries.

Numbers 1 and 3 are both assisted by capable technical assistants; the Directors have also consistently sought advice from the industrial community and have met, so far as I am aware, with no opposition.

It does not appear to me that the Director of Industries has had suitable assistants, nor has he, in the same way, sought the co-operation of industrial men. In consequence, it seems to me he has had small success and has encountered a good deal more hostility than he might otherwise have done.

To return to the first part of this letter—were I in the place of the Director of Industries I should like to have at my side—

1. A first class chemist.
2. A first class engineer.
3. A good industrial business man.
4. A good banker or accountant.

Now it seems to me that Government for years to come would not pay the salaries that such men would require for permanent appointments in addition to technical men for special work, but that they could get competent advice for a comparatively small cost, say Rs. 30 per meeting, which is about what the Madras Port Trust pays per fortnightly meeting.

No one believes more than I do in letting one man run a show when he knows how to do it, but teams are sometimes useful. In this industrial development question, it means groping about, feeling your way and investigating many diverse subjects. Above all things, it is essential and desirable to carry along with you the sympathies and have at your disposal the experience of those already interested in industry, and this is best done by inviting their co-operation, advice and assistance; I am quite sure that industrial men, if properly approached, would be only too glad to assist. A fee is desirable, not as an inducement but as a recognition of services rendered.

A Board would make for continuity of policy; Directors change and need furlough. If the policy of pioneer factories is to be proceeded with, it must be followed up for a period of years. Mistakes, losses and failures are inevitable and I can conceive nothing more unnerving and disheartening to a director who may start off with a number of failures than that the whole weight of responsibility for failures should fall on his shoulders.

I should like to say one word more, the opinion seems to be about that Government should start off with something big. If my experience is worth anything at all [illegible] go to show that all new industries in this country should be started on a small [illegible] steadily and gradually up, no greater mistake can be made than in [illegible] industry on a large scale.

[illegible] opinion that cottage industries are much more likely to lead to [illegible] than one or two large factories.

WITNESS NO. 222.

MR. R. P. GILL of Messrs. R. P. Gill & Co., Guntūr.

WRITTEN EVIDENCE.

My experience of cotton pressing, though extending over 40 years, does not [illegible] beyond this district and, as far as this district is concerned, I have but few opinions to offers for the industry comes under question 3 of the Commission's question list and is a prominent instance of an industrial enterprise where more concerns have been started than can be maintained in full time employment, for there are now 11 presses to press a crop of, say, a maximum of 60,000 bales.

Even were these 60,000 bales averaged amongst the 11 presses, the result would barely give a sufficient amount of bales to each press to yield a profitable return upon its capital, but the condition of the trade in cotton here is such that one particular firm does a proportionately much larger share of the business, amounting to about 40 per cent of the total, say, 24,000 bales, leaving only 36,000 bales for the remaining 10 presses. And even amongst these remaining 10 presses, the proportion of work is very unevenly divided, so much so that almost next to nothing falls to the share of at least 3 of them and in consequence at the present time 3 of them are virtually closed down.

The nominal capital of a cotton press here is about Rs. 60,000, say, for the whole industry 6½ lakhs. This sum has been raised entirely by private enterprise and in my opinion there is no outlet for any further money to be invested in this particular branch of industry in this district; for I see but little prospect of the crop of cotton to be pressed increasing to any appreciable extent and certainly not to the extent of needing any further cotton presses in the district. There is a probability of a railway tapping the western side of the district but in the event of such railway demanding pressing power in its direction, it would only mean that what might be pressed in that direction would be so much less to be pressed in Guntūr, and I think the owners of presses in Guntūr are sufficiently alive to the fact and would supply the need by removing some of their presses to whatever place might secure some work for them. Take for instance the case of Narasarowpet—a cotton press was started there in the year 1913. Prior to the starting of that press, all Narasarowpet cotton came to Guntūr. In three years the Narasarowpet press has diverted so much work from Guntūr that during the past season 14,000 bales have been pressed there. It is now quite "on the cards" that Narasarowpet will not be allowed much longer to enjoy that monopoly and a press will be moved from Guntūr to compete with it and this is a very good instance of how things go on. A press starts, does well, competition arises, and dividends fall, say 50 per cent, and that is a concise example of the condition of so many of the Guntūr presses.

I can find no other questions which seem to apply to this industry.

We have no difficulty at present under the heading of Labour and Supervision for the character of the work is such as to demand very little skill on the part of labourers, and the class of mechanical engineers required is not difficult to find. We have got used to the Factory Act and work goes on without much friction.

ORAL EVIDENCE, 26TH JANUARY 1917.

Mr. C. E. Low.—*Q.* What class of cotton do you deal with?—*A.* Cocanada cotton.

Q. Is the Cocanada cotton adulterated with inferior kinds locally?—*A.* There is considerable amount of adulteration that goes on, but not exactly with other inferior kinds. One of the chief causes of adulteration is the bringing from other parts [illegible] droppings and mixing these with the Kappas when it is being ginned.

Q. That is deliberate?—*A.* Yes.

Q. Does that affect the quality or reputation of Cocanada cotton?—*A.* It must necessarily do so, but it is for those of us who are engaged in the pressing and buying of cotton to eliminate it during the time of pressing and to reject the cotton [illegible] tendered to us that is adulterated.

Q. That is done by small gin owners?—*A.* I cannot lay a charge against the [illegible] gin owners, but there are many wheels-within-wheels in the trade.

Q. Do you think the trader himself is capable of dealing with a [illegible] *A.* Yes.

Q. They are trying to deal with it?—*A.* Yes.

Q. Have you got any system of cotton marks for Guntūr?—*A.* [illegible]

Q. You do not buy from the ryot?—*A.* Very seldom, only [illegible] the system that is in vogue in Guntūr. There is an [illegible]

Q. Are any of the big exporting firms represented there [illegible]

Q. They do not deal with the ryots?—A. The ryots do bring in their cotton and sell it direct to us sometimes, but it is not the usual system. The usual system is to buy so many bales from the dealer and the dealer himself is interested in a certain ryot and he gets cotton from the ryot.

Q. What do you mean by his being interested?—A. He acts as agent for the ryot.

Q. Do you consider that a satisfactory system?—A. When I first went there, we had not that system, but we used to buy from the ryot. But the trouble then was that we could only buy just a small quantity—what happened to come in during the day's market—and if we had an order for 1,000 bales we had no opportunity of covering ourselves with 1,000 bales at a time, but under this system of intermediate dealers we have an opportunity of buying 300, 400 or 500 bales, perhaps, from one man at a time.

Q. But it does not make any more cotton?—A. No. It does not increase the cotton.

Q. Do you think that the existence of that class of men facilitates and encourages adulteration?—A. I would not lay that to their charge.

Q. Supposing it was thought desirable by the Agricultural Department to bring in a superior staple, would they not find this system of marketing through a lot of dealers a serious obstacle?—A. Perhaps I could give you a little more concrete instance. Many years we had the trouble of white cotton being introduced into our district.

Q. Pulichai?—A. No. Ours is red cotton. What we want in our district is to maintain the quality of our red cotton which has a specific quality, and when it is mixed with white cotton it degenerates altogether. Some years ago, we had the trouble of dealers bringing in white cotton from other parts of the district and ginning it together and the seed was mixed and it went out into the fields, and in course of time, the same field and the same tree produced some white and some red. In course of time we eradicated it and for some time now things have been very much better, but this year there has been a change and there has been a very great demand from Bombay and other places for cotton and people who are not acquainted with the quality of our cotton have come into our district and the temptation has been too great to some of the people and they have mixed their cotton up and their seed up and probably next year we shall have the same difficulty.

Q. Do these middlemen help in eradicating it?—A. They are absolutely blind to anything beyond their own interests at the moment.

Q. Do you think it is a practical proposition having spheres of influence for presses? Would you extend that to gins also?—A. I am not a sufficient authority on the subject of gins.

Q. Would you extend it to spinning and weaving mills?—A. That is another matter altogether. I doubt very much whether our climate is suitable for spinning. We have a very dry climate.

Q. It is not a question of climate so much? Do you think that Government would be justified in saying that there should be only two or three cotton mills in Madras?—A. I do not see how they could interfere with our district, because it has a specific kind of cotton, and the crop, in itself, that would be available for a mill, would be small. I have rather a large business in yarn in Guntūr. We get a lot of yarn into our district.

Q. I suppose you would say that gin or press depends pretty well for its existence on cotton in immediate areas whereas a mill does not?—A. Yes.

Q. If Government limits the number of gins or presses, should not Government also insist on the ryot getting a certain price for his cotton?—A. That is entirely a matter of the trade demand.

Q. Supposing the Government say that there will be no more than a certain number of gins, these fellows would have a privileged position and they could very easily make use of it to say "We pay no more for this cotton beyond a certain amount "or" we will charge so much for ginning"?—A. I do not see how Government can step in and fix the price.

Hon'ble Sir Fazulbhoy Currimbhoy.—Q. You said to Mr. Low that when white cotton is mixed with red, there is a light colour?—A. Yes.

Q. And this year they have done the same thing again?—A. Yes. A great deal of white kapass has been introduced into our district.

Q. But is white kapass also grown in your district?—A. No. They bring from [illegible].

Q. What steps have Government taken about that?—A. None.

Q. Do you think that this will deteriorate the quality of cotton?—A. Yes. This [illegible] has been going on from time immemorial. I reported about thirty years [illegible] Collector and gave him instances where stuff had come from and so on, but [illegible] conclusion that it was quite impossible to prevent it.

[illegible] Bombay the darker colour fetches a higher price than the lighter [illegible] staple. We have got two kinds, one is called "ordinary" [illegible] ginned" and the colour of the two are identical [illegible]

Q. Is there not a tendency among the manufacturers to have their own presses in the districts nowadays, because they do not get pure cotton, but adulterated or mixed with lower staple and water and other things?—*A.* We have only one instance of a mill being directly interested in a cotton press and that mill's cotton press in the meantime is silent. None of the others are directly interested in any way with mills.

Q. Do the mills sometimes buy directly from the people who hold these presses in Guntūr?—*A.* This year we had a lot of mill buyers from Bombay and never before.

Q. Has this cotton been going down to Bombay or is it shipped to other parts of the world?—*A.* This is the first year that cotton has been going to Bombay to any extent. A small proportion goes down to the Buckingham Mills and Pondicherry Mills but a larger proportion is shipped from Cocanada to the United Kingdom, Japan and other places. But this year owing to the demand for cotton from the Bombay Mills and also on account of freights cotton has been to a very large extent going to Bombay.

Q. Have the Japanese got their people in your district?—*A.* Not in our district.

Q. You say that 60,000 bales are produced. Is Government doing anything to promote more cultivation of cotton in that part of the country?—*A.* I think the Collector himself is interested in the matter.

Q. Are they taking a keen interest in it?—*A.* We have had changes in the Collectorates and one man may take an interest and another man may not and so on. At present we have got a sympathetic representative.

Q. Is the cultivation increasing every year?—*A.* I can show the figures for the last twenty years. In 1905-06 we had a crop of 75,578 bales. That was almost three times what it used to be at one time, and then it was succeeded by 51,000, by 64,000 and so on until it got up in 1911-12 to 70,000 bales and in 1912-13 to 80,000 bales, but since then it has gone down to the average, that is, about 60,000.

Q. Why?—*A.* To begin with, Government sent round a circular discouraging the growing of cotton and encouraging grain and so on, but I do not know that it had any effect. At any rate, the yield now for some years past has gone back to what was the average, i.e., 60,000 bales.

Q. You say that the climate is such in this part of the country that you cannot have spinning mills. In Bombay we have twenty or thirty varieties while here there is only one kind of cotton?—*A.* Yes. We have a mill in Guntūr which is called "The Guntūr Cotton, Jute and Paper Mills." They never do cotton and paper and it is only jute.

Q. Is it a very big mill?—*A.* No.

Hon'ble Pandit M. M. Malaviya.—*Q.* How many of these presses are owned by Europeans and how many by Indians?—*A.* There are five owned by Indians in the district and of the remaining six, two are owned by Parsis and four are owned by Englishmen.

Q. Is this keen desire to start cotton presses due partly to the fact that there are not other industries flourishing in the district?—*A.* I think what has brought about an increase in the cotton presses here is largely owing to this. I put my press in 1875 and up to 1903 we had only three cotton presses and it was then quite a paying industry and in 1903 another press was started making it four.

Q. Were these Europeans?—*A.* Those were three European and one Indian. The crop was then still 50,000 bales and it was enough to keep them going, but in 1906 when this crop suddenly jumped to 60,000 from 1906 to 1913 we had seven new presses come into our district, that is, two Parsis and four Indians.

Q. Parsis are Indians?—*A.* I am distinguishing between the local Indians and other people. It is that large jump in the increase of the crop and a certain amount of competition between the presses at the same time that have brought about this large increase in the number of presses. The natural tendency of things in our district is to spread away from Guntūr, that is to say, on the western side, cotton ginning factories have been brought there and they make a little coterie of themselves and they put up a cotton press and that means that so much is taken away from Guntūr itself and that again is assisted by money facilities that they receive.

WITNESS NO. 223.

MR. E. J. HAWKINS, *General Manager, the Indian Aluminium Company (Limited), Madras.*

WRITTEN EVIDENCE.

My only experience in raising capital for industrial enterprise has been in connection with the Indian Aluminium Co., Limited. This has been done on three occasions. The first time Rs. 1,00,000 was required, the second time Rs. 2,00,000, and the third time Rs. 2,50,000. There was a slight difficulty on the first occasion as the industry was a new one, but no difficulty on the other two; on the third occasion the required capital was subscribed seven times over. The shareholders in my company are principally European members of the mercantile community, civil and military officials.

With regard to the company which I represent Government has allowed one of their officers to assist as an advisor and permitted the company to remunerate him for the services rendered.

The assistance given to this company was in the form of experience gained by Government when pioneering the aluminium industry and the trained staff which the company took over when plant, fittings, materials, etc., were purchased by my company from Government.

Government assistance.

I would not recommend money grants in aid, bounties, guaranteed dividends or provision of part of share capital. But under certain conditions loans might be granted machinery might be supplied on hire purchase system and Government might guarantee purchase of satisfactory stocks for a limited period.

Government might have a director or consulting engineer with defined powers so long as the assistance lasts. My company is an excellent example as its prosperity did not begin until it purchased the Government industry. The company was floated about two years after Government started developing the industry and we were permitted to watch this development. Government also assisted by allowing purchases of metal to be made on easy terms. When my company considered that sufficient experience had been gained it approached Government through one of its directors (who was a member of the Legislative Council) on the question of Government competing with private enterprise. Government continued developing the business for some time further and when it was well established offered to sell the whole concern to my company. The transfer was completed and the company was thus enabled to put its business on a sound footing.

The assistance thus given was very great and at the same time Government suffered no loss but made a fair return on its outlay whilst it was being used for the development of the industry.

Government success in this particular work was due to the business being entrusted to a scientifically trained officer who treated it as a business concern seeing that the work was carried out on sound business principles. If after investigation by a competent authority Government decide that a new industry should be started or an existing one improved upon—it should be offered to private enterprise for a limited period in which to make up its mind as to whether Government or private enterprise should start it. If not started or made a success of by private enterprise within a given time Government should then start on its own account. When it has been demonstrated that the industry is a paying one it should be offered to private enterprise—preferably a limited liability company in which the interested community would be able to invest and thus allow its people to benefit by Government efforts.

As I stated before, Government should be represented on the Board for a limited period and its officer so appointed should be adequately remunerated by the company. Government might lend experts to firms or companies on payment of all expenses. But the result of such researches should only be published by permission of such company or firm.

Demonstration factories

Demonstration factories should be established in connection with all technical trades schools to prove to the students the advantage of their training and these factories should be run on commercial lines to show actual results and thus induce trained men further to develop their trades.

Assistance in marketing produ

The Victoria Memorial Institute, Madras, is a good example of marketing successfully unorganised industries. A good deal more might be done were a number of good craftsmen settled in workshops in the compound of the institute as it would lead to further demands for their work.

Industrial exhibitions are undoubtedly one of the best means of bringing the seller and purchaser together if not held at too close intervals.

Government should take measures to encourage such exhibitions and they should be both popular in character and aim at bringing sellers and buyers into contact.

Trade representatives should be appointed to represent the whole of India in Great Britain, the Colonies and foreign countries. They should as far as possible have a good knowledge of the industries they represent and be able to speak the language of the country in which they will live.

I do not think the Provinces in India should have trade representatives as commercial travellers should be able to do this work.

Government Departments who use imported articles should publish lists of the same to enable firms or companies who manufacture similar articles in the country to quote Government for their productions. I think that Government Departments should endeavour more than they do at present to purchase articles made in India.

Training of labo and supervision.

My company has employed skilled men from Europe with varying results, sometimes unsatisfactory owing to the unfavourable conditions for them after work is [illegible]

Technical schools should improve mechanic's efficiency and skill.

My company has trained a very large number of workmen and the [illegible] been very satisfactory.

Industrial schools should be under the control of the Department of Industries.

There should be a Director of Industries. He should be an expert official and should have had a scientific training especially in engineering.

In this connection I think there is an excellent opening for the manufacture of gas and oil engines and pumps. I certainly think that a system of registration and disclosure of partnership should be introduced.

Existing canals could be improved with advantage to allow of motor transport.

Railway freight on aluminium is very high on account of its being so light, but this bears heavily on producers as the goods have to be packed in strong wooden cases which sometimes weigh as much as the aluminium articles and the same rate of freight has to be paid on the case as on the goods inside.

The Periyar scheme has been investigated with I believe satisfactory results.

Supplies of aluminium have been cut off for nearly two years with the result that my company has practically ceased to manufacture aluminium hollow ware and has had to turn its attention to brass, copper, and iron ware. Aluminium is needed for the manufacture of aeroplanes, airships, motor cars, high explosive, and the equipment of troops especially water bottles and cooking utensils. Aluminium could be produced in connection with the Periyar scheme. There are large deposits of high grade bauxite in the Central Provinces, which could be extracted near the source of supply and railed to the most convenient centre where the Periyar power would be available or to the Bombay area where sufficient electrical power should be available on completion of the new Tata schemes.

ORAL EVIDENCE, 26TH JANUARY 1917.

Hon'ble Pandit M. M. Malaviya.—*Q.* You say that the shareholders in the Indian Aluminium Company are principally European members of the mercantile community, civil and military officials. Can you tell us any reason why Indian capital has not been invested in it? Did you invite Indian capital?—*A.* The prospectuses of the company were distributed broadcast and capital was invited when the company was floated. I think the reason was that as it was an entirely new industry in India they did not want to risk capital. They knew nothing about it.

Q. That was the case when the enterprise was first started, when you asked for the first one lakh. On the second and third occasions there was no difficulty?—*A.* Then we had none at all.

Q. When was the company started?—*A.* In March 1900.

Q. When were the experiments which the Government made in pioneering the industry completed? When was it known that it was a success?—*A.* In 1903.

Q. You were the first company to take it over?—*A.* We were the first and the only company.

President.—*Q.* What did Government hand over to you?—*A.* Government handed over to us everything, the plant, stocks, the workmen. We took everything. There was a regular Government concern.

Q. Who valued the stock?—*A.* The Superintendent of School of Arts and our managing director.

Hon'ble Pandit M. M. Malaviya.—*Q.* Were you doing business as an aluminium company before you took it up from the Government? Did you form a company to take it up?—*A.* We formed a company in 1900. The aluminium industry was running for about three years and then we took it over from the Government.

Q. It was on your representation to Government that it wished to hand over this industry which was then competing with a private industry?—*A.* Yes.

Q. You say in your note that your company has employed skilled workmen from Europe with varying results sometimes unsatisfactory owing to the unfavourable [illegible] tions for them after work is over. What have you done with these workmen? [illegible] sent them back?—*A.* They have left.

Q. Do the men that you have trained find employment in your company or go outside?—*A.* Nearly all of them remain with us. We have about [illegible] the war, we employed about 400 men.

Q. Do you take apprentices?—*A.* We have taken boys. They [illegible] nothing at all when they come.

Q. Do you pay them anything at the start?—*A.* We pay them [illegible] begin with.

Q. How long does it take to train them? When do they [illegible] regularly?—*A.* They will be earning good wages in about five [illegible] get more every year up to a certain amount.

Q. [illegible] many aluminium companies are there in India? Do you know?—*A.* I think [illegible] in Bombay and there is one in Madras. There are five altogether in [illegible]. Two factories started under Indian management but they both failed.

Q. Apart from the existing conditions due to the war do you think that there is [illegible] for the growth of this enterprise in this country?—*A.* Certainly.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* The concern that you took over from Government, what did it cost Government?—*A.* I think we paid 2¼ lakhs to Government for the concern and I think that Government made a small profit over it.

Q. They made a small profit?—*A.* Yes. I am only speaking from memory. I cannot be absolutely certain. Government did not lose in any way.

Q. What was the capital of the company that you started three years before you purchased the Government concern?—*A.* One lakh.

Q. And were you making profits before those three years?—*A.* Yes.

Q. Would you like to have a Government director on the Board because you have taken over a Government concern?—*A.* We have not felt the need for a Government director, as we already had experience in the industry.

Q. When a pioneer industry is transferred to a private individual don't you think you want a Government director on the Board at least for a certain number of years? Don't you think that Government should be represented on the Board for a limited period?—*A.* Yes. I agree with you because I think the Government has spent a certain amount in pioneering the industry. They should be able to satisfy themselves that it is carried on under proper conditions.

Q. Do you think that any person who takes up the enterprise will agree to this suggestion of having a Government director on the Board?—*A.* I do not think there will be any objection. It will be a sound thing to have.

Q. You are not in favour of a Board of industries?—*A.* I do not know what exactly you mean.

Q. There may be a body to assist the director which may be partly elected and partly nominated. The Director of Industries might work with that Board and take their advice?—*A.* I should think that the Director of Industries hardly needs any advice. He will be able to act himself.

Q. Do you think that he is such a genius as never to want any advice?—*A.* I do not say that altogether. He will be glad to take advice. But it will not be incumbent on him to act on that advice. The Board should not control his actions, it should only advice.

Q. They will not be able to control his action. If he and the Board differ, it will be for the Government to decide the matter. The Board and the director may place their views before the Government?—*A.* I see no objection to that then. What I say is that the Board should not be able to control the action of the director by itself.

WITNESSES NOS. 224, 225 AND 226.

(1) MR. A. F. BUCHANAN, (2) W. NEILSON, AND (3) J. W. KEITH, ***Messrs. Parry & Co., Madras.***

NOTE.—*Mr. Buchanan submitted written evidence and was examined orally with Messrs. Neilson and Keith. The written and oral evidence is confidential.*

WITNESS NO 227.

THE MADRAS TRADES ASSOCIATION.

WRITTEN EVIDENCE.

[illegible] of the opinion that in normal times capital can be readily raised by private [illegible] subscription when it is a question of starting new businesses or industries for [illegible] or manufacture of goods and products that have already proved successful [illegible] and when such enterprises are organised by men of known and proved [illegible], yet in the case of pioneer or experimental enterprises we believe that [illegible] of obtaining capital are considerable. This Association considers that [illegible] be done to overcome these difficulties through the inauguration of a [illegible] or industrial bank with headquarters in the Chief Presidency towns [illegible] agencies in the mofussil, such bank being authorised to advance [illegible] of new or expansion of existing experimental enterprises [illegible] and safeguards. It might be found possible to utilise the [illegible] for this purpose, the Government trade or industrial [illegible] Capital.

We are not in favour of Government giving money grants, bonuses [illegible] the advancing of loans without a reasonable rate of interest being charged. Loans would be granted by the Government trade or industrial bank in consultation with and by direction of the Director of Industries and his advisers, when the conditions governing the commencement of such enterprise as may be proposed prove on investigation to hold out reasonable prospects of success. It should not be impossible or difficult for the head and local officer of the bank concerned, with the Director of Industries (who should have authority to call in the assistance of any expert opinion that might be required) to come to a decision regarding the prospects of such enterprise, the amount to be advanced and the rate of interest to be charged. The financial interest in the concern thus acquired by Government would be gradually reduced as the business factory prospered. We do not propose that Government should have any actual control over the conduct of such concern, other than as regards the audit of its accounts and general supervision of its financial affairs. If it was eventually found that the enterprise could not be made commercially successful, it should be closed down.

In all cases where the products are suitable for Government's requirements it should be the policy of Government to guarantee to purchase such manufactures.

We are strongly of the opinion that with such a bank and guarantee a powerful incentive and much needed aid would be given towards the establishment of new industries in this country, while such methods would do away with actual competition by Government itself.

We are not generally in favour of Government starting pioneer factories, though we recognise that a useful purpose might be served in instances where private enterprise is lacking or inefficient and a public good is sought. In these cases such factories should be at once closed if found unsuccessful after a fair trial, or converted at the earliest possible moment into a public company if proved successful.

As regards research we are of the opinion that the existing Government institutions provide a sufficient means of research for this country's present requirements, but would suggest that means be taken to bring such institutions, their work and the uses that may be made of them, more prominently to the notice of the general public, in which case we have no doubt their aid would be more widely sought after.

Commercial museums serve a useful purpose, but only if they can be made fairly exhaustive as regards the exhibit of products and manufactures in India and are instituted throughout the country in the principal centres. It should be possible to utilise them as regular centres for the purpose of bringing sellers and buyers into contact. Exhibitions undoubtedly have their uses, but unless popular in character, are unattractive and possibly produce little in the way of permanent results.

We are in favour of the Government departments publishing lists of imported articles used by them but see no necessity for their exhibition. Samples should however always be obtainable by local manufacturers when required, either on loan or through purchase.

As regards the purchase of stores by Government departments this Association has noted with satisfaction the instructions that have been issued from time to time by Government regarding the purchase of goods manufactured in India but regrets that so far as lies in their experience these instructions appear to have borne little fruit. There is a natural, but regrettable tendency to keep on ordering in the old grooves, there are prejudices in favour of English manufactures to be overcome, and it saves time and trouble to indent for an English made article of well-known make, rather than look around and discover whether the article in question cannot be obtained from a factory in India. Government would do well continually to impress upon its departments the good that would arise and the general forward impetus that would be given, to local industries, if such local industries were assured of satisfactory support in the form of regular Government orders. In this connection we would draw attention to the remarks made in this Association's letter, dated 15th December 1914 addressed to the Chief Secretary to the Government of Madras on this subject (vide copy attached hereto). The Rules as issued by the Government of India, Department of Commerce and Industry (Stores), No. 5829-5876-11, dated Simla, 24th July 1913, would seem to be all that is required, but in practice they appear to have little effect and this Association is of the opinion that Government should make it their special endeavour to see that they are carried out in a more liberal spirit than is at present the case, more especially where Rules 1 and 2 are concerned.

Another point which in the opinion of this Association calls for attention is the hyper-critical attitude of many Government Departments regarding certain manufactures. It is hardly to be expected that articles turned out of factories in India can in all instances show at once that high finish that may be expected from a long established factory in England. This Association understands that goods are rejected for this reason though their durability and utility were in no way impaired. [illegible] critical in this respect is not helpful and in many cases is [illegible] and utility and while the highest standards should be aimed at ultimately, criticisms made by Government officials should be helpful and not hyper-critical, a certain amount of latitude being allowed in the earlier stages of manufacturing.

Training of labour and supervision.

In our opinion the existing Government industrial and technical schools cannot impart practical instruction so efficiently as the workshops in which any particular industry is carried on, but as adjuncts to such workshops they should prove of value. The latter portion of this Association's letter dated 15th December 1914, to the Chief Secretary to Government of Madras (already quoted above) also deals with this subject.

No advantages that have resulted from the establishment of industrial and technical schools have come to our notice with one exception, viz.:—the Government School for Printers attached to the Government Press, Madras, which is producing good results. This school is under the control of a practical superintendent, but we believe this is not so in many cases, a defect which in our opinion further mitigates against favourable results being obtained.

Industrial schools should be under the control of the Educational Board advised by the Director of Industries. Systematic efforts should be directed against the prejudice which exists among certain classes to manual labour, which prejudice constitutes a serious hindrance to industrial improvement and progress in this country.

Official organisation.

We consider there should be a Director of Industries in each province. He should be a man with a sound business experience, commercial abilities and organising power. He should not be recruited from the present Government service and his salary should be sufficiently high to induce the best men to take up such posts as permanencies. He should have power to call to his assistance, when required, an Advisory Board consisting of leading business and manufacturing men of the district. He should be in close touch with the Government trades and industrial bank as suggested in Part I. A Board of Industries or an Imperial Department seems to us not necessary at the present time. Each province should develop its own resources. An annual conference of Directors of Industries might be held, for the interchange of views, ideas and experience.

IX. Other forms of Government action and Organization.

Trade marks and names.

We consider that suitable provision should be made for the registration of trade marks and names with safeguards against the infringement thereof.

Registration of partnership.

We are strongly of opinion that it is desirable and practicable in the interests of trade to introduce a system of registration or disclosure of the names of the members of all business concerns European or Indian carrying on any business under names not their own, a small fee should be levied for such registration and suitable penalties should be enforced for failure to register or misrepresentation.

We would suggest that such legislation be on the lines of the Bill lately introduced in the House of Lords with such modifications as might be necessary for this country.

In this connection we would also like to draw attention to the large number of purely Indian businesses (mostly small concerns) carried on under European names. This should be checked and discouraged, even by special legislation if necessary. In many instances it is only the desire to use the names of highly placed officials or well known men, but in other cases there is without doubt intent to imitate and to deceive, very often successful in the case of such firms as deal with upcountry residents. Such cases would of course be disclosed in their native towns through registration, but this would not suffice, unless the names so registered were by law compelled to be printed on the firms stationery.

Jail competition.

We consider that the articles required by Government are sufficiently varied to provide work for the various trades and manufactures carried on in jails and under these circumstances no jail products should be offered to the public.

Copy of letter from the Chairman of the Association, to the Chief Secretary to the Government of Madras, dated 15th December 1914.

In common with all who are interested in the commercial and industrial development of India and who desire to take advantage of the opportunity now afforded by the partial closing of the markets of Europe to stimulate local production and foster home industries, my Association has given special attention to this matter and is gratified to observe the sympathetic attitude of the Government of Madras as evidenced by a recently issued Press communiqué dealing with the development of local industries. I am desired by the members of my Association to give expression to their view that it is within the power of the Government to materially promote local enterprise and stimulate trade generally in the Presidency by ensuring that the orders for goods required by Government and by institutions over which Government exercises control or influence are placed with the manufacturing and trading firms of this Presidency. At present the bulk of all Government orders are sent to the India Office for execution in Europe and only emergent requirements are enquired for locally. If it were the settled policy of Government to encourage local effort by guaranteeing a percentage of its orders to producers or suppliers on the spot, there is every reason to believe that local firms would be enabled to increase their facilities for production or supply to a scale which would ultimately enable them to execute in their entirety a large portion of Government orders. It is of course conceded that in the essentials of price and quality the goods so obtained must bear a reasonable comparison with articles of a similar nature now purchased in Europe. It is not to be expected that local firms could immediately undertake to fill either large or unusual orders, but enquiries would at once elicit information as to the directions in which Madras firms could expand their resources so as to meet future requirements. It is felt that the possibilities of local enterprise have not been fully exploited and that some misapprehension exists on the part of heads of departments as to present available resources. Under the stimulus of assured support, there is scope for considerable development and I venture to believe there is sufficient enterprise amongst Madras manufacturing or trading firms to take the fullest advantage of all the support Government is prepared to give them by extending their present operations. Appended to this letter is a list of articles which are regularly manufactured by members of my Association.

In this connection, I am desired to point out that the promotion of technical education, in which Government rightly takes so great an interest can be largely secured while stimulating industries. No industrial or technical school can impart instruction so efficiently as the workshop in which the industry is carried on practically. Men who have received training in a technical school are not regarded by employers as completely efficient workmen, and there can be no doubt that the serving of an apprenticeship to any trade is of more value in creating a body of skilled workmen than theoretical instruction in a school, technical instruction in a school is a valuable adjunct to practical experience in the workshop, but cannot take its place. Much might be done to overcome the prejudice against manual labour, which is the greatest stumbling block to industrial education in this country, by the establishment of a system of apprenticeship under skilled foremen, such as must necessarily follow the extension of factories and workshops called for by a steady demand from Government. Adverting to the attached list of articles already manufactured in Madras it may be remarked that in the production of these articles the workmen receive sound practical training in general tool using, in their care and the manufacture of them, in free hand art drawing and general draughtmanship, in general carpentry and wood-polishing, in the tempering, casting, soldering and sharping of many kinds of metals,—in glass grinding and polishing in ordinary painting work,—in turning, milling, slotting, wood-pattern making, drilling, boring, gear-cutting, metal, wheel-making and fitting blacksmiths and tinsmith's work and in general mechanism.

The benefits which must accrue to trade generally and to the artizan population of Madras especially from a substantial increase in local production of articles now imported from Europe are no doubt fully appreciated by Government, but my Association considers that Government might do more to stimulate these industries by insisting in all cases within its control on the placing of orders locally and in bringing pressure to bear on higher controlling authorities to give greater freedom than exists under present regulations to its officers to exploit and encourage local efforts.

ORAL EVIDENCE, 26TH JANUARY 1917.

THE MADRAS TRADES ASSOCIATION

was represented by

(1) MR. R. J. C. ROBERTSON, *Managing Director, Messrs. P. Orr & Sons, Manufacturing Jewellers, Goldsmiths, etc., Madras.*

(2) MR. A. T. LUKER, *Director, Messrs. Addison & Co., Engineers, Stationers Printers, etc., Madras.*

(3) MR. A. M. MACDOUGALL *Engineer, Messrs. Simpson & Co., Carriage Builders, Motor Engineers, etc., Madras.*

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* About the Director of Industries do you not consider there is need for a Board of Industries?—*A.* We have stated that the local Director of Industries should have power to call to his assistance an Advisory Board consisting of leading businessmen and manufacturing men of the district.

Q. Leading business men would not like to be called whenever the Director wants them. If there is a regularly constituted Advisory Board they can meet once a week or whenever needed. Would not the advice of business men and the representatives of the several chambers and other bodies be of great assistance to him?—*A.* Undoubtedly. It seems possible that businessmen in the locality would be in a better position to give the Director advice.

Q. The Advisory Board might offer its advice to the Director of Industries and whenever there is any difference it could be settled by Government?—*A*. You could have a standing Advisory Board. They ought to be able to give expert advice whenever called upon to do so.

Q. You say that you are not in favour of any Imperial department and you seem to think that Provincial Directors of Industry would be able to do all that is necessary?—*A*. Yes. It appears to us that each province should be able to develop its own resources.

Q. The different provinces cannot afford to keep all the experts that may be necessary for developing industries. Don't you think that in this case it would be a good thing if there were an Imperial Department from which experts could be taken whenever there was any necessity for them?—*A*. We doubt very much if you could get in the Imperial Department all the different experts that may be needed.

Q. Don't you think there will be overlapping if the Imperial Department and the Provincial Departments both had their own body of experts?—*A*. Different provinces have their own needs and each has to develop on its own lines. Each province will be able to develop in its own way with the help of its own department. In that case it will be in a better position to develop its resources. We do not see there is any special reason for an extra department run by the Imperial Department.

President.—*Q*. Supposing you had a Director-General of Industries such as Sir Fazulbhoy is referring to, he would be able to correlate the activities of the different Directors of Industries in the various provinces prevent overlapping of energy on the part of the various Provincial Governments and provide the necessary facilities that are required in every industry. He could maintain a body of specialists in all the important industries and their services could be lent to the different Governments who could call for their services. They would thus form a central reservoir and they could be drawn upon whenever necessary?—*A*. If each province had its experts their services could be utilised in other provinces. Other provinces could obtain a loan of their services.

Q. There is the proposition of the Director-General without a Board and that of Director-General with a Board of specialists. Which would you prefer?—*A*. We would prefer a local Board.

Q. The local Board would advise the local Director of Industries. Don't you think you need a Director-General of Industries to correlate the activities of the different provinces?—*A*. We think that that is a good proposition.

Q. Do you think it necessary for him to have an Advisory Board of any sort?—*A*. We think the Advisory Board should be adapted to the needs of each province.

Q. In addition to the local Advisory Board?—*A*. The Advisory Board could consist of the Directors of the various provinces. As an aid to the local Director of Industries in obtaining assistance he might be useful. We do not know with whom the final voice would rest as to whether an industry should be started or not. We think it should rest with the local Director.

Q. In any system of administration there is bound to be a certain amount of decentralisation of authority and Local Governments should have power to start and encourage industries up to a certain extent. That obviously follows. There may be cases in which the local Government may be starting a thing which might be better done in some other province and there would be loss and undue competition. Don't you think that in such a case the presence of a Director-General of Industries would straighten out competition?—*A*. We have got sufficient confidence in the good sense of the Local Boards. We think the local Government which starts the industry is the best judge of what will be good for the province.

Q. There is another matter that has been brought before us and that is in connection with the difficulties in regard to railway and transport facilities. They vary very much in the different provinces. The question of transport facilities varies in the inland provinces and in the coast provinces. Don't you think there ought to be some one to keep an eye on all these things and take action?—*A*. We think the local Directors of Industries might be trusted to put up a case in matters like that.

Q. The matter must go to some one and some one will have to decide it?—*A*. We think the Commerce and Industry Department will be able to do that. They would have a deciding hand in the matter.

Sir F. H. Stewart.—*Q*. With regard to the purchase of stores by the Government you say that the present rules are satisfactory but that the spirit of them is more observed in their breach than in their observance. Do you think it would be a good thing if Government were to publish a list of all their requirements and send it round?—*A*. You will see that we have opened our remarks on this subject of Government patronage with the following words. "We are in favour of the Government's publishing lists of imported articles used by them". We think that covers the point which you now bring forward. We think that would be a very good idea.

Mr. Robertson.—*Q.* Do you think that it would be a good thing if the Government had a purchasing department out here?—*A.* That would be a good thing. That would be the authority to whom we could go direct. Messrs. P. Orr & Sons, Ltd., could expand their business considerably if we were assured of a regular demand for their goods. They make mathematical and scientific instruments.

Q. They are making them themselves?—*A.* Yes. They import lenses and graduated rings. But the rest of the things they make themselves.

Q. You mean here in India?—*A.* Yes.

Q. With reference to the registration of trade marks, that seems a very thorny question. The general opinion seems to be that it is rather difficult to carry it out by legislation. Do you find that you have not got sufficient protection at present?—*A.* I should say not. Unless the person can show that he has used the name or mark consistently for a number of years and thereby obtained a moral right to it, his case will fall to the ground in a court of law. We have a case of a pirated mark in point.

Q. A concrete case helps us very much in a matter of this kind. Will you send us in particulars*?—*A.* Yes. And I would also like to bring one other matter before the Commission and that is what we refer to in the last paragraph of our note on the subject of Government patronage. "Another point which in the opinion of this Association calls for attention is the hyper-critical attitude of many of the Government departments regarding certain manufactures." In some instances they want an extra standard of finish out of the local manufacturers which cannot be obtained at once. That is a matter which I do not know if it is within the scope of the Commission. But I certainly think that in the case of a new manufacturing industry that a certain amount of latitude might at first be shown as long as the article is durable and the utility is in no way impaired, a high standard of finish to be ultimately required.

Q. Are there many members of your Association besides yourselves who do much in the way of manufacturing out here?—*A.* Not a great many. We have tried to pick up a certain amount of business with Government in instruments. But in some instances they are really over critical.

Q. It would seem that if there were a central stores purchasing department there would be more uniformity in this matter?—*A.* I think that such a department would be a great help indeed. Such a department would know where to go for the articles.

Hon'ble Pandit M. M. Malaviya.—*Q.* You suggest that rules regarding the purchase of stores might be made still more liberal and that the spirit of the rules should be more in evidence?—*A.* We think that the institution of such a department as has been suggested would greatly aid that.

Q. And the aim should be to encourage indigenous enterprises and not insist upon indigenous products equalling the foreign articles in finish?—*A.* Not at first, as long as durability and utility are unaffected.

Q. Do you think it would promote the object which you have in view if along with the list of articles required by Government it was also stated from what firms the articles were purchased in the previous year, if it was shown what articles were purchased in India?—*A.* We do not think that would serve any useful purpose so far as we are concerned.

President.—*Q.* One of the suggestions that have come before the Commission is this, that there should be an Indian Stores Department which should play the same part as the Stores Department in London. Apart from that if it was shown what articles were purchased locally and what were imported would it not help you? Don't you think that the spirit of the rules would be carried out in the direction of the encouragement of private enterprises?—*A.* We do not see how it would.

Hon'ble Pandit M. M. Malaviya.—*Q.* Don't you think it would be useful if a list were given of the articles purchased locally and the articles purchased from abroad?—*A.* That would be more useful. But we cannot say whether it would serve any useful purpose to say from what firm the thing was purchased.

Q. Would that not lead to an increase of business? Take for instance, Messrs. P. Orr & Sons. They are manufacturing scientific instruments. If it is made known that they are manufacturing such and such instruments and that the Government is ordering its supplies from there, will they not then get orders from other directions too?—*A.* As far as the firm is concerned, that would be a sort of advertisement. Of what value it would be we are not prepared to say. We see no objection to it but at the same time we do not see any good in it.

Q. It may not be of advantage to you now after you have established the industry and established a name. In the case of a new industry would it not be useful?—*A.* Yes. As regards the supply of certain classes of things.

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* Vide additional written evidence printed after oral evidence.

Q. If manufacturers knew what Government had taken from firms, say, in Madras, in Calcutta and Bombay and the amount of the purchase, that would be an incentive to other manufacturers to produce a similar article?—*A.* It is generally known from where Government makes its purchases.

Q. This should be an encouragement to persons connected with the particular industry?—*A.* If one wants to start any particular new industry there are many places where one can get the required information. Anybody who wanted such information would be able to get it from the department. We do not see that it is necessary for Government to advertise the actual source of supply.

Q. Supposing anybody wanted to know how much of stationery was bought in a particular year and what the quantity of it was, he should be able to get the information readily from the published list without applying to any one for it?—*A.* We do not see any objection to it individually.

Q. You are of opinion that workshops should be attached to industrial schools and that they should impart training in industrialism, that the workshops should be well equipped and up to date?—*A.* We think they would serve a very useful purpose.

Q. You say that there is need for separate trade or industrial banks to finance industries. You suggest that there should be established branches and agencies of such a bank in important centres. Do you think that the Government should find all the money for the bank or that the Government should contribute partly to its funds?—*A.* We think that the Government should establish such a bank and find the funds.

Q. Suppose Government did not see its way to do that and suppose Government were willing to guarantee interest at 5 per cent on whatever money may be deposited for a certain number of years, do you think then that the public will subscribe to the funds of such a bank?—*A.* We should think it quite possible. We think it would have to be higher than five per cent.

Q. That would depend on the conditions of the market at the time. I suggested five per cent as a fair amount of interest to be guaranteed by Government for a certain number of years say five or ten. If the Government made such a guarantee do you think that the public will take shares in the bank?—*A.* We should think there is a good possibility in it.

Q. The two means that you suggest for giving an impetus to industries then are the establishment of such a bank and the guaranteeing of the purchase of indigenous industrial concerns. You think that these two methods will give a great impetus to industries?—*A.* We think so. They would undoubtedly.

Q. Would you also suggest in addition that there should be a bureau for supplying information to industrialists as to the possibilities of development in different parts of the Presidency?—*A.* That would come under the scope of the Director of Industries. Supposing one wishes to start an industry one should approach the Director of Industries and seek his aid either to obtain finance or to obtain expert advice. If he considers that the project is worth considering then he will recommend money for the starting of the enterprise.

Q. Would you expect to receive all the financial help without putting any money yourself or would you make it a preliminary condition that you should subscribe a certain proportion of the capital before the Government should help you?—*A.* That will depend on circumstances. We should say that as much of private capital should be found as possible. But no doubt there would be instances in which a man might have a very sound knowledge of an industry and he may not be able to find the money.

Q. In such a case you would recommend that Government should finance all the capital necessary to give it a start?—*A.* It will be within the discretion of the Director of Industries to recommend that such a thing may be done.

Q. That can only be in the case of pioneer work or in exceptional cases. But in the case of ordinary industries, what would you recommend?—*A.* We would not stand in the way of any sound industry being carried out if in the opinion of the Director and his advisers it is worth carrying out and we think that in that case the money should be found.

Q. You have made it clear in the course of the evidence that you are not in favour of an Imperial department. With reference to the importance of having a department to deal with the industries of the province, do I understand you to say that the present needs of the provinces show that there should be an authority in the province to consider proposals for developing industries and for pushing them forward?—*A.* Yes.

Q. Do you think that a person who needs help will be better able to approach the local Director than some authority in Delhi or Simla?—*A.* We certainly think so.

Q. How long has your association been in existence?—*A.* It has been in existence before I (Mr. Robertson) came to Madras 17 years ago. It was incorporated in 1882.

Q. How many firms are members thereof?—*A.* 24.

Q. Are they all manufacturing firms?—*A.* They are all trading firms.

Q. Have you got any Indian firms among the members of your Association?—*A.* Yes. There are seven Indian firms.

Mr. A. Chatterton.—*Q.* (Mr. Robertson). In regard to the question of the registration of partnerships would you like to make it compulsory that the partners in Messrs. P. Orr & Sons should be made known?—*A.* Certainly. It would not however apply to Orr & Sons, who are registered under the Companies Act. It would be possible for any body to ascertain who our partners are.

Q. You say that there should be a Director of Industries but you prefer that he should not be recruited from Government service. Have you got any reasons for that particular statement?—*A.* As far as we can see he should be a man of sound business experience and commercial experience. The great fault at present is that there is no continuity of policy. The official who is appointed Director remains for some time and then he is promoted to something better. In Madras we have had three directors in 18 months. One man does a thing and it is not continued after he leaves. There is no continuity of policy. If the position is made lucrative and a high salary is attached to it, then you can get a good man from outside the Government service too. He would have the experience and the training that will be necessary to hold the post.

Q. You are in favour of industrial schools being put under the Department of Education?—*A.* Yes, taking the advice of the Director of Industries whenever necessary.

Q. (Mr. Macdougall.) In your case do you consider that the training given in the School of Arts Industrial school is good?—*A.* Yes. I should think so. They turn out good workmen.

Q. Have the Madras firms any regular system of apprentices?—*A.* I belong to Simpson & Co. We have been coach-builders since 1840. The carpenters were purely engaged in carriage building. The father brought his son to the firm and there was a sort of hereditary connection. We are doing our best. The difficulty is to get a good class of labour.

Q. Have you got any system of apprenticeships at all?—*A.* We have got a system. If a boy is intelligent we take him on a starting salary. We keep him on a nominal agreement for three or four years. The salary increases every year.

Q. In your case you prefer to get a man who is already trained in some mechanical engineering shops and then make him specialise in a particular class of work?—*A.* Yes, if he can.

Q. (Mr. Robertson). Have the other firms any system of apprenticeships?—*A.* In our firm P. Orr & Sons, Ltd., the son following his father's footsteps applies to a considerable extent. That is specially the case in the goldsmith's work. There the father takes his son to help him in his work.

Q. Do you take only artisans of a particular type, belonging to a particular caste?—*A.* Not necessarily. We take any body who is likely to turn out a good workman.

Sir F. H. Stewart.—*Q.* With reference to the registration of trade marks have you ever been asked for an expression of your views by the Local Government?—*A.* I think not. We have considered the matter ourselves on certain occasions.

ADDITIONAL WRITTEN EVIDENCE.

(*Submitted after oral examination.*)

With reference to the oral evidence given before you by our representatives and your request that we furnish you with instances of the pirating of trade marks and trade names, we addressed our members on this subject and have the honour to enclose you herewith letters in original received from Messrs. Oakes & Co., Limited, dated 20th March 1917, and Messrs. Spencer & Co., Limited, dated 22nd February 1917, and the copy of a letter submitted through one of our members (R. Maclure) from the Eastern Representative of the firm of Messrs. J. Gosnell & Sons, London.

There is no doubt that under existing conditions there is great difficulty and delay in obtaining an injunction to stop the use of a pirated mark, or name, and it is practically impossible to do so unless you are in a position to prove priority of use, that you have used such a mark for a considerable period of time, and have built up a business on it. Even when successful in obtaining an injunction against the wrongful use of such a mark, damages can very rarely be recovered.

From—Messrs. Oakes & Co., Ltd.
To—the Secretary, Madras Trades Association.
Dated—the 20th March 1917.

With reference to your letters of the 16th and 17th instant addressed to our head office and Royapuram branch, we have to state that in years gone by we had frequent complaints with regard to infringement by native merchants of our cigar trade marks.

Madras Trades Association.

but we did not take the matter up seriously, consequently there are no records except of one which occurred in 1913; in this particular case we did place the matter in the hands of our solicitors. The name of the firm is and the mark infringed was our best selling line, viz., "Oriental" cigars, but in this case we could only trace the dealer and not the manufacturer, therefore the matter was closed.

From—Messrs. Spencer & Co. Ltd.
To—the Secretary, Madras Trades Association.

Instances in which native firms have pirated the name "Catamaran" as applied to the well known brand of Spencer & Co's cigar.

In 1911 Newell & Co. manufactured cigars and called them "Catamaran." They were advised that the name was Spencer & Co.'s property, but refusing to recognise this a suit was filed against them in the Trichinopoly Court O.S. No. 66 of 1911 in which judgment was given in Spencer & Co's favour, after considerable delay, in March 1912. Spencers sued for damages but recovered only court expenses. This decree was advertised and cigar manufacturers generally were warned against making use of the word "Catamaran." Notwithstanding this fourteen firms, in addition to many others, have used the name, and have only discontinued doing so on the matter being placed in the hands of our solicitors.

Another instance of pirating a well known name is the case of the British American Tobacco Co. *v.*. Sheik Ismail Sahib and another. The case in question was tried in the Madras Courts under O.S. No. 159 of 1909 and judgment was given on the 20th December 1910. In that judgment it was shown that the B.A.T. & Co. were entitled to the name "Scissors" when used in connection with cigarettes, and the defendants and others were prohibited from using the same.

From—JAMES WRIGHT, Esq., Representative of Messrs. J. Gosnell & Sons, London.
To—the Secretary, Madras Trades Association through Mr. R. Maclure, Madras.
Dated—Calcutta, the 10th March 1917.

Yours of the 6th March. Regarding imitations, as all the particulars of my prosecutions go to London for Gosnell's perusal I have neither date nor any other particulars to give you beyond the fact that for last few years I have had an average of about six or more cases per annum against importers of Japanese imitations of Gosnell's powders and soaps. These have taken place at Colombo, Bombay and Rangoon and in Japan itself where they actually put up the article with Gosnell's name and address, London.

After considerable time I eventually won this case, and also I believe at the present "Pears" are prosecuting in Rangoon for Japanese imitation of the Glycerine Soap. The number of imitations have been so numerous of Gosnell's goods that they have placed the matter before the Board of Trade in London, as it leads to much expense and after winning your case I had the experience of the Magistrate fining the party Rs. 5 which was no deterrent and he put me to much greater expense of appealing. This he lost but the whole expense was mine, as I took him into the Criminal Court at Colombo. This you can't do in Rangoon owing to a ruling of the High Court which was allowed to stand through the party not taking his case to higher authorities. In my last case at Rangoon without knowing of this decision I prosecuted in the Criminal Court and before the same Magistrate who gave me a decree the previous year; and this time although he said it was certainly an imitation he could not convict owing to the ruling I have mentioned. I then put the matter in hand civilly, and the offending party came to terms and paid all expenses, destroying the stuff. The Government could stop all these imitations at the Custom-house and proceed against the importers as they are the people who give samples of well-known lines and get the Japanese to make them. It is a great hardship to the original manufacturers, for in one case I had to stop my journey to Shanghai and return to Colombo at once to be present when my case was called. I got decree and expenses but the usual native trick prevailed. He went bankrupt and I failed to get anything. The Government in conjunction with the Japanese Government could stop these imitations easily, and if it was once known by the importers that the Government could prosecute it would frighten them to import. I am aware through my solicitors in Yokohama that one man registered 36 British and American trade marks in his own name at Tokio in one day and Gosnell's was among the number. However, in looking over the trade mark book of the Government I came across Gosnell's, and at once applied to have this man's title to it removed and I was successful. The reason he managed to register Gosnell's was owing to faulty registration by the agent employed by Gosnell and the flaw entitled him to get a fresh registration in his own name, and if I had not observed it before the three years, the trade mark by Japanese laws would have been this man's and the first lot of our goods entering Japan after would have been confiscated, such is Japanese law.

Imitation of everything British or American having a big sale are limited in Osaka. I trust this information may be of some use to you.

WITNESS No. 228.

DR. GILBERT SLATER, *Professor of Indian Economics, University of Madras.*

WRITTEN EVIDENCE.

Financial aid.

There are certain reasons specially applicable to India, for aiding private businesses preferably by other means than by (1) money grants-in-aid, (2) bounties * and subsidies, (3) guaranteed dividends, (4) loans without interest, and (5) provision of share capital--

(1) The revenues of India are extraordinarily small compared with the area and population.

(2) In consequence, the most urgent and necessary governmental activities, e.g., highways, sanitation and education are hampered at every turn by lack of funds.

(3) The revenue, besides being small, is to an exceptional degree inelastic. In consequence the rise of prices which has been continuous in India for many years and *which is likely to continue* (with fluctuations) for a number of years to come, tends to have a greater effect on expenditure than on revenue. If expenditure on existing services is prevented from expanding by refusing increases of pay to compensate for higher prices, efficiency will be sacrificed.

(4) There are special political difficulties in the way of increase of taxation.

(5) With regard to loan capital, the Government has hitherto only succeeded in raising relatively small funds for the great enterprise to which it is already committed—railway extension.

The general theoretical objections to such proposals, (1) that such help cannot be provided to all businesses and industries alike, nor given to all industrialists who apply for it, (2) that the task of distinguishing between applicants impartially and judicially, is an extraordinarily delicate and difficult one, and one for which the Government organisation is not fitted, (3) that the reaction upon the efficiency and repute of the Government service might be bad, and (4) that the reaction upon business management would almost certainly be bad—these objections are in a specially high degree applicable to India. A very strong case for a particular industry might, of course, over-rule these objections. It should, however, be proved that the particular industry is vital to the prosperity or progress or defence of the country.

There remain three suggested methods of giving Government aid—

(*a*) loans with interest,

(*b*) supply of machinery and plant on the hire purchase system,

(*c*) guaranteed Government purchase of products,

Taking these in inverse order,

(*c*) to the guaranteed Government purchase of the product of an industry which it is desired to aid I see no objection provided, (1) the Government requires the product, (2) the quality is satisfactory, (3) there is no reasonable fear of the supply failing at an awkward moment, (4) the price either is reasonably low or can be reduced during the period approximately to the level of competing foreign products.

(*b*) *Supply of machinery and plant on the hire purchase system.*—This appears to be a most valuable way of helping the small type of business that prevails in India. It is already applied in the form of well boring, and supply of pumps and water-lifts to agriculturists. It is one of the simplest and most effective possible ways of helping handloom weaving. Some standardised form of improved loom, with winding and the other necessary subsidiary machines, might well be supplied to every applicant, payments being spread over four or five years. It would also be necessary to organise the supply of *spare parts*, in order that repairs may be quickly and effectively carried out. Otherwise the improved loom degenerates into something more expensive, but scarcely more efficient, than the country loom.

There appears to me to be a very strong case for the manufacture of the improved handloom and the subsidiary machines by the Government itself, in order to secure *uniformity*, which would allow the manufacture to be carried on on a large scale and the cost per loom minimised, and the looms supplied to the weavers at the lowest possible prices.

The hand loom weaving industry shows such remarkable vitality in the presence of mill competition and is so well suited to the peculiar circumstances of India that there can be little doubt it will well repay further effort to increase its efficiency.

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* Bounties may be in some countries and in some circumstances a more eligible form of protection than import duties. In India they are the less eligible form. Import duties on manufactures designed to be protective would probably succeed only very partially in their main purpose, but be very serviceable to the revenue, and, if judiciously imposed, would tax the Indian people in fair proportion to their ability to pay.

(*a*) *Loans with interest.*—These should not be provided (except in some special case, for very valid special reasons) directly by the Government, but indirectly through a further development of the banking system, as by some such scheme as that urged by Sir W. B. Hunter before the Indian Finance and Currency Commission.

A central bank with headquarters at Delhi and a branch in London, working with the Presidency Banks, with power to raise capital in London and to issue notes without metallic backing in order to give the currency necessary elasticity.

The Central Bank should, in order that it may enjoy public confidence, be guaranteed by the State, and as a corollary the Government should share in the profits above the guaranteed minimum, and exercise some measure of control.

The benefits to be expected are (1) that excessively high rates of discount during certain months would be obviated, (2) the rate of interest when business houses want loans would be reduced, (3) the scale on which the Presidency Banks can do business would be much increased.

Pioneer factories.

The economic motive behind the demand for pioneer factories is clearly the desire to have in India industries which come under the law of Increasing Returns—which are necessarily those which are situated to large scale production. This consideration should determine the planning of a pioneer factory.

In a country in which business ability is abundant and well trained, it may be worth while for a Government to establish pioneer or demonstration factories in order to test whether an industrial process which satisfies laboratory tests will also be successful under manufacturing conditions. Such factories may be a useful link between a technical research institute and the industrial community.

But in India general business ability is as wanting as technical skill and knowledge.

Therefore in order to be really instructive in India, a Government pioneer factory should be one in all respects worthy of imitation by private enterprise. It should be designed to *succeed* commercially. It should be put in charge of a thoroughly competent chief, who should have a free hand, especially in appointing and dismissing subordinates. There should be no hesitation, if this would lead to efficiency, in obtaining from abroad men to fill *all* posts from department managers to foremen, admitting from the locality only coolies and boys. It should chiefly be differentiated from a factory run purely for profit by the following characteristics:—

(*a*) The hours should be limited, and attendance at educational classes compulsory.

(*b*) Boys in particular should work short hours (say half time from 16-18, ¾ time from 18-21).

(*c*) The instruction should be in English, Arithmetic and suitable elementary Mathematics, and the principles of the sciences related to the manufacture.

(*d*) As the native workers become trained and show their competence they should be promoted until the factory is completely manned by them.

(*e*) As far as practicable reliable Indians or other British subjects desirous of establishing competing businesses should be given facilities for studying processes and methods.

With regard to the stage at which it should be closed or handed over to a private company—

(1) It should be closed when the Government is satisfied that the experiment is a failure, and cannot be made to succeed without a disproportionate outlay.

(2) It should be handed over to private capitalists —

(*a*) as an alternative to closing, if private capitalists offer to take it over,

(*b*) or even if successful provided there is good reason for believing that private capitalists can and will carry it on more profitably, and with equal advantages to the interests indirectly affected (e.g., sellers and producers of the raw materials, purchasers of the product),

(*c*) but in this case it should only be handed over provided the private capitalists will pay a proper price based on reasonable anticipation of future profits.

These conclusions follow inevitably from consideration of the fact that the Government being the trustee of the general public well being, the interests of the Government are the interests of the community and must not be sacrificed to the gain of a few individuals.

Where the above conditions are not met, successful pioneering experiments should become permanent Government enterprises.

This may be illustrated by a particular example. A Madras Government Pencil Factory should aim at nothing short of driving Faber and Hardtmuth out of the Indian market. It may be objected that it would then leave no room for a private pencil business, but—

(1) the profits that flow into the coffers of the State are of more value to the people than those that go to private capitalists,

(2) the presence in Madras of a really successful and well managed pencil industry would do much to teach Madrasis to run other manufacturing industries. A pencil factory run in a half hearted way neither teaches people how to make pencils satisfactorily nor how to do anything else.

The policy outlined above can be combined advantageously with the plan of sending young men to study the industry in foreign countries.

Research abroad.

Q. 22.—Research abroad has played a very important part in Japanese industrial development. Japanese students swarm in Great Britain, parts of Europe and America, learning everything that will help them in their future work.

When I have come into touch with these students I have invariably found that they *had their work waiting for them* on their return to Japan. On the other hand with respect to the comparatively few Indian students learning industries abroad there seems more usually than not complaint that they have great difficulty in finding employment in which to utilise their acquired knowledge.

The Japanese method seems preferable.

Surveys for industrial purposes.

Q. 25.—The following surveys seem required in the Madras Presidency:—

(1) A water-power survey of the Nilgiris, Palnis and High Range and Western Ghats, to ascertain the amount of hydro-electric power available and the conditions under which it can be profitably utilised. A similar survey of rivers flowing into the Bay of Bengal.

(2) A mineralogical survey conducted by mineralogical chemists to look, more particularly, for the rarer minerals for which a demand is now being created by the advance of science.

(3) A forestry survey to ascertain whether scrub jungle which yields but little firewood and nothing else of value cannot be replaced by valuable forests.

Very valuable agricultural surveys have been carried out by the Madras Department of Agriculture, and this department is quite capable of extending its work with incalculable benefit to the Presidency, if supplied with larger funds.

Sales agencies.

Q. 30.—These are generally found essential to the prosperity of cottage industries.

I understand that Messrs. Marshall, Field & Co. of Chicago have arranged with the Sourashtras of Madura for a sample collection of all varieties of cotton and silk goods woven in the Madura district.

The Victoria Institute acts as an exhibition and sales agency for South Indian art industries. It should, I think, have been placed in a shopping centre, and modelled rather on Liberty's or Selfridge's than on a museum. It might be worth while to establish a branch for sales in Mount Road.

But the most promising line of development would appear to be sales agencies in London, Paris, perhaps Petrograd and Moscow, New York and Chicago and other cities if these succeed for the sale of brass work, wood carvings, printed cottons, embroidery, lace, etc. In this way the producers might be brought into touch with the market and the development of new designs might be encouraged.

Training of labour.

Qs. 48 *to* 50.—I was for a number of years on the staff of Woolwich Polytechnic, (1897 onwards).

The efficiency of that Polytechnic varied from year to year according to the condition of the Arsenal. When the Arsenal was working on the 8 hours day, without overtime, the efficiency of the Polytechnic was extremely high—from results it appeared to be far higher than any other Polytechnic in London. When overtime prevailed the efficiency of the Polytechnic dropped.

The Arsenal authorities were convinced by experience of the advisability of instituting special classes for boys, *in working hours*, which were held in the Polytechnic, and which the boys attended in sections. This was found very successful. To the best of my knowledge this is typical of English experience.

Youth is the time for learning; but to expect growing lads and young men who have not reached their full strength to attend industrial classes after a full day's work is little short of cruelty.

Industrial schools should be under the Department of Industries. Otherwise they would have little practical value.

Under this head I desire to draw attention to what is in my opinion, the most important principle of all for Indian industrial development; the principle that all higher and technical education, to yield satisfactory results, must be built upon a sound foundation of good elementary education. In India there is the attempt to build upon a foundation of elementary mis-education.

We have schoolmasters at 6 to 10 rupees per month. Obviously these men are schoolmasters because they are unfit to be anything else—and most of all, unfit to be schoolmasters. A competent schoolmaster instils competence into his pupils, an incompetent schoolmaster instils incompetence.

No man should be appointed to take charge of a school of any sort unless he has been so trained that he can be trusted to instil the habit of thinking accurately, and working honestly. The minimum of money arithmetic should be taught, the maximum of exact measurement. I should like to see the post of headmaster of a village school ordinarily combined with that of public vaccinator and sanitary inspector, because—

(*a*) It would be easier in that instance to secure that a decent salary is given.

(*b*) It is bad for a schoolmaster not to have outside work dealing with *men and things*. If he gives all his time to teaching children, his mind also becomes childish, and he deteriorates even as a schoolmaster.

(c) The scientific training necessary for his sanitary and medical work would be the best training for him as a schoolmaster.

(d) Indian sanitation requires the presence of a trained man in as many villages as possible. The dignity, self-respect and usefulness outside school of the schoolmaster should be fostered as far as possible. It is regrettable that any hindrances should be placed in the way of his working in the co-operative movement.

Official organisation.

Qs. 56 *to* 62.—The history of the Department of Industries in the Madras Presidency appears to me to indicate—

(1) That the department has great possibilities of usefulness and should be systematically developed.

(2) That the first reform needed is to raise the pay and status of the Director of Industries, and to appoint a Director with a view to his occupying the post for a considerable number of years, with an exceptional degree of freedom of initiative.

(3) For this reason I think it would be well, at least temporarily, for him to come immediately under His Excellency the Governor.

(4) For the Director of Industries the most important qualifications are—

(*a*) General administrative ability,
(*b*) A scientific training and a general acquaintance with the nature of modern industry.
(*c*) Knowledge of India and Indians.

Special knowledge of any particular industry, though desirable, is not essential.

On the whole, excluding the possibility of finding a man of genius, the most suitable appointment would appear to be that of an Indian Civil Service man of proved administrative ability, but still fairly young, who had taken a high science degree, and had been born and bred in a great industrial centre.

Expert knowledge of particular industries should be secured in subordinates.

(5) I should not recommend, at present, an Advisory Board for Madras. At a later period it would probably be useful. At present there is considerable risk that the wrong sort of Board would be appointed, and it would be better for the Director to seek such advice as he requires in the quarters where he finds he can best obtain it.

It will be time enough to consider the appointment of such a Board when a Director of Industries, after not less than five years experience in the department, recommends it.

(6) The step immediately advisable with a view to the correlation of the separate activities of the various provinces is, I consider, a periodical conference of Provincial Directors of Industry. I would suggest that there should also be at the same time and place a conference of Provincial Directors of Agriculture, and that the two conferences should be lodged and have meals together.

From such conferences suitable plans for Imperial organisation might be expected to originate.

The Indian Science Congress.

Q. 76.—There are now a number of men in India working specially at Indian Economics. Professor Jevons' appointment in Allahabad is a new one, so is mine in Madras. Bombay University is planning important developments, of which the appointment of a Professor of Economics and Sociology is a part. The study of Economics in India in the past has been too much associated with political controversy; and economic facts and theories used as controversial weapons. It is now time that economics should be recognised as a science to be pursued in a scientific spirit.

In these circumstances, on my initiative, warmly supported by Sir Harold Stuart, the Madras Economic Association has urged that there should be an economics Section of the Indian Science Congress.

The results of such inclusion, in my opinion, would be—

(1) an impetus to the study of Economics on concrete, practical lines, and in a scientific spirit,

(2) an invaluable opportunity to economists of different parts of India to meet one another, and to meet workers in other fields of science, whose results are the raw material for the economist,

(3) a useful reaction upon the physicist, chemist, biologist, etc., through the fact that the economist is primarily interested in their researches from the point of view of their probable bearing on industrial development.

With this Economic Section the Indian Science Congress would, in my opinion, be more useful than at present in assisting industrial development.

Quality, Adulteration, Misdescription.

Qs. 89 *to* 93.—These questions are vital.

Two instances may be given from one district alone—Tinnevelly. There senna is an important crop. It requires intensive cultivation, and yields, under normal conditions, a very high profit per acre. But the price has recently slumped to one-fifth of what it was recently. The cause of this may be in part over-production, but the main reason is adulteration.

A wild plant, called avarai, resembles senna. It has some medicinal value and will pay for picking and exportation if sold for what it is. The Indian dealers instead used it to adulterate the senna. The mixture, merely because it is a mixture of unknown proportions, is obviously useless for medical purposes, and as soon as this is realised, the commercial value also disappears. But not content with this, the local dealers went on to adulterate with other wild leaves—some, I am informed, being *poisonous*.

The other instance I refer to, that of pulichai, is doubtless well known to the Commission. But I desire to point out what appear to me to be aspects of the pulichai question which have not yet received the attention they deserve.

Cotton is the greatest Indian manufacturing industry, jute being a good second. Cotton growing is among the most important Indian agricultural industries. The world demand for cotton is continually growing, and nowhere can production be increased as easily as in India. With, allowing for naked children, close on three hundred million wearers of cotton within Indian borders, there is room for enormous expansion in Indian cotton manufacture, and also for far greater assistance being given than at present, to the Lancashire mills. But for either of these developments the question of *quality* of cotton is vital. The Indian cultivator gets, compared with the American or Egyptian, a miserable yield in point of quantity—but to get even this he sacrifices quality. His chief concerns are weight of crop and ginning outturn. If better cottons are grown in small quantities, the grower cannot get the increment of price to which he is equitably entitled.

A bold and comprehensive policy appears to be indicated, including—

(1) A tax on raw cotton exported out of the Empire. This would (*a*) yield revenue, (*b*) assist Indian mills to meet the very fierce competition threatened from Japan.

(2) A considerable portion of the produce of the tax should be used to directly help the cultivators.

(3) All dealings in seed should be controlled by Government. There are big issues involved, and the cotton problem appears to demand a special enquiry.

The extraordinary prevalence of adulteration in India no doubt springs from certain peculiarities of the ethical codes and religious systems of India, i.e., from deeply rooted sociological causes. The very same causes have the consequence that stringent legislation against adulteration would be unpopular; and the same causes acting upon the police force would make enforcement of the law exceptionally difficult. It is not surprising therefore that the Indian Governments hesitate to attack the most flagrant and calamitous practices by direct repression. But the very lack of legal penalties against adulteration helps to maintain the popular impression that it is at the worst a mild and venial fault.

It is, I think, insufficiently recognised that the common experience of countries when passing through the stage of production by numerous small producers is that adequate measures for prevention of adulteration and maintenance of quality, both in material and workmanship, must be taken.

If India is to make any real industrial progress I believe the adulteration and misdirection problem must be tackled with determination, and the efficiency of the police system increased to the necessary degree. Mere increase of police pay would not, probably, effect much ; but a considerable increase is a necessary preliminary step.

A system of Government certificates of quality to be applied for voluntarily appears a most hopeful expedient. If taken up its educational effect would be so valuable that the cost, in my opinion, should be met out of general taxation, and only nominal fees charged to the certificate holders. As a general rule I might suggest that there should be compulsory certificates for new industries, and voluntary certificates fo existing industries.

Railways, etc.

Qs. 97 *to* 100.—My attention has been drawn to the case of the Koilpatti Mills some way south of Madura. There are special railway rates for coal for Madura, bu if the Koilpatti Mills manager tries to take advantage of the Madura rate, by bookin to Madura and then on from Madura to Koilpatti, he is not allowed to bring on th coal in the same trucks. He is required to unload at Madura, and reload into th same or other trucks, and the cost of this unnecessary operation and the loss of coa makes the cost prohibitive. When I saw the mills the manager had been compelled i consequence to give up using coal and heat his boilers with wood.

I do not know what reason the South Indian Railway Company has for this policy but on the face of it, it appears to be inequitable and productive of loss both to th mills and to the railway.

It is possible that this instance is typical, and that a more generous policy wit regard to carriage of fuel, raw material and finished product of manufacturing establishments is required.

A much more obvious requirement in South India is railway reconstruction. I is extraordinary that for the vast and thickly populated district stretching fro Madras to Tuticorin, with the great towns of Kumbakonam, Tanjore, Trichinopol and Madura on the way, there exists as main line only single metre-gauge track, whic takes corkscrew course, a slow, dangerous, inconvenient system.

With regard to waterways, it is well known that the original plan of Josiah Heath's Iron Companies was to bring the iron mined at Kanjamalai, near Salem, by river to Porto Novo; but the development of irrigation works spoiled the navigation. In South India (I mean here India south of Madras) I apprehend the demand for water for irrigation will continue to block development of waterways.

There is an indefinite field for development of high roads and village roads. No effective system of administration appears to have been worked out yet. A study of English experience in relation to high roads would be found suggestive. Responsibility must necessarily be divided between the Provincial Government and the local authorities. Some local authority (whether it should be the Taluk Board or the District Board I cannot offer an opinion) might be primarily responsible, and authorised to levy such cess as may be necessary for maintenance and new construction. A certain part of the cost (half or even more) should be met by grants from above, given only after inspection provided the maintenance is satisfactory and the due annual proportion of necessary extension carried out. On the other side villages should be entitled to levy themselves to meet part of the cost of getting connected up with adjoining highways if without such connection. It might be worth while to provide some technical training in road-making and maintenance.

Hydro-electric power surveys.

Q. 102.—The high table lands of the Nilgiris, Palnis and High Range appear to offer unexplored resources in the form of hydro-electric power. For instance the annual rainfall at Kodaikanal is about 60 inches. There is a large area of land five thousand feet and more above the level of the plain at the foot of the Palnis. Supposing one-third of the rainfall be available for power, we have a daily supply of energy of $\frac{20 \times 1{,}760 \times 1{,}760 \times 9 \times 62\frac{1}{2} \times 5{,}000}{12 \times 365}$ foot pounds for every square mile of high land utilised, i.e., about 20,000,000,000.

It would appear that, as soon as there is a local demand exceeding the supply available from the Periyar and other rivers, there is here a source of hydro-electric power capable of almost indefinite development.

In conclusion I desire to emphasize my view that in planning the superstructure it is well not to forget the foundations, and that the only sound foundations for Indian industrial development are (1) good elementary education and (2) freedom from adulteration and steady improvement in quality of agricultural products.

NOTE.—*Witness did not give oral evidence.*

WITNESS NO. 229.

HON'BLE MR. J. O. ROBINSON, *Managing Director, Spencer & Co. (Limited), Madras*

WRITTEN EVIDENCE.

Capital.

Q. 1.—I have had experience in the raising of capital for such enterprises as general merchants, cigar manufacturers, hotel proprietors, and breweries. The concerns I have been associated with have experienced no difficulty in obtaining all the capital required, either by public subscription or from banks.

Q. 2.—In my experience the capital has been drawn mainly from European sources, occasionally from Parsis, seldom or never from the natives of this country.

Q. 3.—I am not aware of any industrial enterprise which has failed as the result of too much competition. In my opinion industry in this country fails more from inefficiency than from any other reason.

Q. 4.—I deal with this under the heading of pioneer factories (Q. 7).

Government assistance.

Q. 5.—(1), (2), (3) and (4). I do not believe in the grant of Government aid, in the form of cash, to either existing or new industries, except on commercial principles, through a Government or State industrial bank established for that purpose. The rate of interest charged by an industrial bank would have to be higher than that charged by the Presidency Banks, in order to cover the greater risks, but I think an experiment might be made in this direction. I think in the first instance, the experiment might be made most easily in the form of a new department allied to, or affiliated to, each Presidency Bank. This would enable Government to make a practical experiment, before committing themselves to the larger proposition of a State industrial bank.

(5) I understand that Government give their guidance, but not their guarantee, to ryots and others for the purchase of machinery and plant on the hire purchase system. In the case of the smaller ryot requiring assistance, I think that Government might reasonably extend their risk in this respect.

(6) In my opinion Government should not provide any portion of the share capital of companies other than railway companies, and companies floated for the purpose of improving communications.

Q. 6.—As I object to direct Government assistance in the form of cash, I object also to Government control. I do not believe in a Government director for any form of commercial enterprise, apart from railways and communications.

Pioneer factories.

Q. 7.—I have seen the result of the financial aid given, by the Government of Madras, to the establishment of a factory for articles manufactured from aluminium, and on the whole I would say the experiment has been justified, mainly because, as the result of it, there is at present in Madras an efficient factory for the manufacture of articles from aluminium, which must have proved of great use to the Government, and the Indian Army, during the present war. There is however the wider question whether it was the business of Government to organize, at great expense what was essentially a highly efficient metal workshop, for the purpose of transferring it ultimately to a limited liability company. There is not the slightest doubt that what was done was done efficiently, and the only adverse criticism I have to offer in connection with it is that a workshop for the manufacture of articles from aluminium could, and ought to, have been established without Government assistance. All the articles produced were manufactured from imported aluminium, and it seems to me that, in conjunction with this experiment, an effort should have been made to get over the difficulty of producing aluminium in India. There may be something on record with regard to this, but if so I am not aware of it.

Q. 8.—I think Government should concentrate their efforts, in the way of pioneering to the provision of raw materials, as that is a form of development in which Government can legitimately take risks. When the raw material is available, I consider it the business of trade and commerce to continue the manufacture. The danger, if any, of Government interference with private enterprise has been grossly exaggerated, and, at this stage, I do not consider it necessary to place any limits or restrictions upon the efforts of Government on the lines I have suggested.

Financing agencies.

Q. 9.—In my experience no industry, properly established and conducted, is hampered by the conditions under which it is financed. If it is good enough to be developed, it can be developed.

Q. 10.—I have already referred to the possibility of establishing a State industrial bank, although I would like to make it clear at this point that, within the limits of their powers, I consider the Presidency Banks have done everything possible. It is however just a question whether the time has not come to go further, and in my view, any development of banking in this country, to be successful, must be founded on the organization and experience of the Presidency Banks. I do not know to what extent, if any it would be practicable to affiliate a new department, for the financing of industries, to a Presidency Bank, but if the branches of the Presidency Banks are not made use of to form a nucleus in the mufassal for the expansion of banking facilities, I fail to see how any other organization can be efficiently and promptly devised to take its place. Government could exercise all the control necessary through the medium of the Presidency Banks, and it appears to me that this would be not only the simplest, but the most efficient method of extending Government assistance.

Co-operative societies.

Q. 11.—I do not know of any industry which has been developed by the formation of co-operative societies.

Q. 12.—I think that co-operative societies should be established for the purpose of building houses, and thus encouraging the small property owner. There should be no difficulty in obtaining a model upon which to work. In the larger cities a co-operative building society should prove very helpful to the middle and lower classes in obtaining suitable houses at a reasonable cost. In this connection I consider it imperative that Government should acquire some rights in the increase of the value of land within municipal limits.

Since writing this paragraph I am glad to see, from the draft of the new Madras City Municipal Bill, that Government propose to give the Madras Corporation power to tax the "unearned increment" within municipal limits, and I hope they will not waver from this policy. There is not the slightest doubt, in my mind, that city improvement and reform are seriously retarded by the greed of the owners of property and land, and it will never be possible to improve communications by the widening of roads and the removal of slums, until this difficulty is radically dealt with.

Limits of Government assistance.

Q. 13.—As before said I am strongly of opinion that the danger of Government interference with private trade has been grossly exaggerated. Surely it is obvious that Government should not attempt to do anything which trade and commerce have proved capable of doing themselves, and I do not consider any other restriction necessary.

Q. 14.—If there is an established external trade I fail to see the necessity for Government to give assistance to any new enterprise with the object of competing with it, unless the established external trade has acquired, or is acquiring, an improper monopoly.

Commercial museums.

Q. 28 *and* 29.—I have my doubts about the utility of commercial museums and though I would not venture to criticise them adversely, I am rather of opinion that Government resources would secure better results if they were employed in bringing India into closer touch with foreign countries, that is to say I consider an efficient commercial agency, showing samples of products, would do more good if established in Paris or Petrograd, than a commercial museum in Calcutta.

Sales agencies.

Q. 30.—The Victoria Technical Institute has done something to dispose of the products of unorganized cottage industries, but I am aware of no other sales agency that has given effective help. In my opinion cottage industries will not develop until they are sure of a regular and continuous market for their manufactures. An intermittent and uncertain demand must inevitably discourage the development of cottage industries, which have neither the means nor the organization to create a market.

Exhibitions.

Q. 31.—In my opinion industrial exhibitions, though of indirect utility, must have a considerable advertising value, quite apart from the fact that they must help to educate and instruct the poorer classes.

Q. 32.—I think Government should encourage such exhibitions, if only from the point of view of education. Exhibitions bring country people to the towns, and must have the effect of enlarging their ideas, particularly in such matters as simple machinery.

Q. 33.—I think the exhibitions should be popular in character, but not to such an extent that amusements are permitted to swamp the object of the exhibition. The exhibition should not be permitted to degenerate into a fair.

Trade representatives.

Q. 34.—I think India should be represented in the Colonies and foreign countries by direct Agents, not through London. Business between India and foreign countries should be decentralized as much as possible. The London offices of all the more important businesses in India are, like the India Office, much too jealous, with the result that business is overcentralized. India, as represented by British merchants, does not know nearly sufficient about foreign countries, and will never learn, if merchants do not make an effort to visit, and to deal directly with the countries with which they hope to trade. No representative the Government could possibly appoint will take the place of the individual effort necessary to put this matter right. I think an efficient consular service would be of material assistance in this matter, and surely it is obvious that if a consular agent, or trade representative is to give effective assistance, he must have practical business experience.

Q. 36.—I do not think any action is called for in this respect.

Government patronage.

Q. 37.—Manufacturers who mean to do business can always ascertain what the Government is importing. I do not think any useful purpose would be served by exhibiting samples in commercial museums, but Government departments might keep Chambers of Commerce and Trades Associations informed of what they are likely to require. A more sympathetic effort should be made to encourage local manufacturers, especially as local manufacturing is still in its infancy and the outlay is not likely to be large. The point the Government should realize is that if the manufacture of mathematical and surveyors' instruments, for instance, were encouraged in India, it would lead to the manufacture and improvement of other saleable articles. The difficulty at present is that Government do not purchase articles that are available now; still less do they encourage the manufacture of others.

Q. 38.—I have no criticisms to offer regarding the rules for the purchase of stores by Government departments, except to state that an effort should be made to make their system of accounts less unwieldy. It is preposterous to insist upon stamped receipts before payment, when accounts are paid by remittance transfer or cheque. Is it not possible to improve the Government system of accounts with the aid of Chartered Accountants, who could provide the necessary commercial knowledge? The size and multiplicity of the forms should be curtailed.

Supply of raw materials.

Q. 40.—As I have stated in paragraph 8 I think Government would be justified in going to great lengths in order to provide supplies of raw materials, and in order to make Government assistance effective, it would probably prove necessary to give substantial concessions for the transport of raw materials by rail. The question of cheap railway transport is vital, for distances in India are so great that it would otherwise be impossible to compete with goods imported from Europe by sea.

Trade marks and names.

Q. 94.—In my experience the present state of Indian law relating to trade marks and trade names is far from satisfactory, for in the case of "Spencers'" cigars their brands have been pirated repeatedly, and they have seldom been able to obtain redress. There are difficulties no doubt in the way of giving manufacturers full protection, but I think the law should be made more stringent.

Registration of partnerships.

Q. 96.—In my opinion it is desirable to introduce a system of registration and disclosure of partnerships, and this is especially the case when the name under which a partnership is trading is calculated to mislead the public. I do not think that the Indian proprietor of a small shop on the Mount Road, Madras, should be permitted to trade under the name of "Pentland" or "Chelmsford" & Co., for although it is unimportant in itself, the principle is wrong and should be put a stop to.

Note.—*Witness did not give oral evidence.*

WITNESS No. 230.

MR. P. M. LUSHINGTON, *Conservator of Forests, Southern Circle, Madras Presidency.*

WRITTEN EVIDENCE.

Before considering the actual questions asked by the Commission, I consider it necessary to state in a short resume what has been done by the Forest Department in Madras to promote industrial enterprise. *There is little doubt that our most successful efforts have been by means of plantations not only of indigenous but also of introduced trees.* The teak plantations of Nilambur are well known but have been insufficiently considered from an industrial point of view. They were started with a view to supply local requirements in teak but, owing to close planting and rich soils, the wood produced is not so suitable for building or furniture making as for the special purpose of ship building. The wood commands a high price in the market but almost all goes to the Persian Gulf where it is used in the construction of pattamars. There is at present a very considerable area planted and private individuals, seeing the profits made by Government, have started their own plantations in the same locality. Formerly Bombay traders from various parts used to attend the sales but latterly these have been absent and it is certainly a matter for enquiry as to why these merchants are absent.

2. Another large industry which was started by the department is the production of Casuarina plantations more especially in Guntur, Nellore, Chingleput, South Arcot and Trichinopoly. This industry has now been given up and in my opinion rightly so. The wood produced is not manufactured into any particular article but is invaluable to factories of all sorts. Under the advice given by the late Inspector-General of Forests (Mr. Beadon Bryant) we have sold our plantations with the unplanted land and in South Arcot and Trichinopoly the ryots themselves are raising plantations on a large scale and we may well leave this industry in their hands. In the Guntur district however there are very large areas of waste sandy land suitable for plantations and it is a question whether the ryots ought not to be induced to cover these lands with Casuarina by means of loans. The existence of these large sandy wastes, coupled with a pernicious system of irrigation known as "Spring Channels", is a source of great danger to the community.

3. Another example of a successful introduction is seen in the Nilgiri Eucalyptus plantations. These have kept the firewood supply of the Nilgiris at a very low price but they ought to serve a far larger purpose industrially in the supply of acetone. A proposal was made some years ago to start an acetone factory and a meeting of merchants was called. The merchant protested that this was an interference with private enterprise but no one was found enterprising enough to start a factory. This, I submit, was a case where Government instead of shelving the whole matter might well have started a pioneer factory (Question 7). Had it proved a success, this factory might have been left to private working and a similar factory introduced into the Palni Hills in the neighbourhood of Kodaikanal. These would probably have extended to other suitable places.

4. Another industry which was introduced by the department was the growing of the cashew nut in South Arcot in soils unsuited to other cultivation. It is true that in many places there were areas under cashew long before the department started this work but the Forest Department concentrated their efforts on unfavourable soils (Question 107) with the result that they were copied by the ryots, to the great benefit of the country and the export trade from Cuddalore and other ports.

5. I do not wish to prolong this note but by these examples I wish to issue a warning against the too rigid adherence to the policy (Question 105) inaugurated on the advice of Mr. Beadon Bryant that further plantations should not be made. I am aware that when he made his suggestion we were inclined to spend too much on artificial reproduction but, as some of our greatest successes have been due to plantations, I wish to point to the danger of this policy being carried to an extreme.

6. I now turn to another most important industry, as far as my circle is concerned, viz., the production of sandalwood oil. The production of sandal has been very much neglected and its protection has been sadly deficient. It is true that we have for some years been extracting some wood from the Javadis of North Arcot and from some of the Salem hills but it is only recently that proper enumerations of this valuable tree have been made in the Javadis, the Hosur taluk of North Salem, and the Chitteris of South Salem. It has also been ascertained that we have in the Pachamalais of Trichinopoly and South Salem an area of about 25,000 acres and in the Kollimalais of the same districts an additional 10,000 acres. In the Shevaroys of North and South Salem we have probably another 10,000 acres and several thousand acres in the [illegible] of South Salem. All these areas are practically undeveloped and especially in the [illegible] malais and Kollimalais, thousands of trees are being destroyed [illegible] unprofitable cultivation. But, the sandal is by no means confined [illegible] named. It occurs more sparsely in Tinnevelly, Madura and [illegible] my circle there are extensive areas in North Coimbatore and [illegible] found in South Kanara. These localities are in the Western [illegible]

circle the plateau of Palmaner is eminently suited to the growth of this tree and it is spreading rapidly. It is also found round Madanapalle and Horsleykonda in the district of Chittoor. It is also found sparsely in Cuddapah and Kurnool and has been introduced into Vizagapatam. It will be seen then that we have this tree practically all over the Presidency and it only requires systematic working to very largely increase the output. For this we require specially trained Working Plans Officers.

7. Mysore is even more largely interested in this tree than we are and are introducing factories for the distillation of oil. Our outturn is not at present sufficient to justify a factory of our own but I consider we should work our oil in conjunction with Mysore and save large quantities of export.

8. A further industry that requires a great deal of working up is the bamboo industry. From the districts of North Vellore, South Vellore, North Salem and South Salem, we obtain an annual revenue of no less than Rs. 1,04,000 and yet we are absolutely ignorant of the proper sylvicultural treatment of the various species. It is true that we bind our contractors by certain rules but it is lucky for us that they are usually ignored because where attempts have been made to carry them out the results have proved disastrous.

In order to put this matter on a satisfactory basis we require a local research officer. Not only would such an officer be able to provide us with proper rules for working but probably he would be able to organise the working of bamboos for paper in such districts as Malabar, Coimbatore and Kurnool where there is a plethora of the Bambusa Arundinacea.

9. I now turn to another large industry which I consider has been greatly neglected by the Madras Government, viz., the production of tanning material.

The chief tanning material is the bark of Cassia Auriculata (Tamil—Avaram, Telugu—Tangedu) and it is in connection with this that a change of policy is needed. This Cassia is a first class tan but incidentally, because it belongs to the Leguminosæ; it is one of the many trees and shrubs that can be used for green manure. This has been fatal to the growth of the shrub because Government has recognised the ryots' claim to it and at the same time recognised that large contracts are given for this tan. This half-hearted policy has been ruinous to the shrub. An officer should be put on to enquire into this matter and explain to the ryots that the tan is of far more value than removing large quantities of leaves for manure. He should also make an enquiry as to the conditions most suited to the growth of the shrub and as to whether it would not pay to give over fields to its cultivation. This shrub is itself an answer to question 107 for there is no doubt that it would be possible to concentrate it on limited areas.

The next great source of tanning material is the gallnut and in this connection there is a large waste of material. I have been particularly struck with the enormous quantity of trees in the Javadis, Kollimalais and Pachamalais and all the hills of North and South Salem. In the hills the trees are greatly respected by the Malayalis who, in ponnakading, save this tree from destruction, but the collection of this material throughout the forest is most deficient. The first way to improve collection is to insist on the contract being sold separate to the other forms of minor produce contracts and specially to watch the contract and see that the hillman is being properly treated by the contractor. If this has not the desired effect it may be advisable to take up the collection departmentally for a period. The value of this system is not in the profits made from it but in the knowledge acquired of amounts available and of prices of collection and sale.

Incidentally departmental collection brings the hillman into much closer touch with the officers of the department which is often a thing much to be desired.

Apart from these two sources there are in our forests enormous supplies of undeveloped tanning substances.

Divi-Divi is common in many districts but, for want of being in touch with the right merchants, the sales of pods are very poor. Many of our best tans are practically unknown both to Forest Officers and to the market.

In order to develop the possibilities of this industry, we require a Research Chemist and a Research Economist.

10. I only wish to mention two other forest industries, viz., pencil and match-making. I am particularly interested in the latter because I believe that, but for an accident, Messrs. Khuddas Badcha & Co. would have established a factory 25 years ago in Madras and we should have been able to clear our forests of many of our soft woods. Both industries, together with the pulp industry, are now being taken up by the Director of Industries in Madras but there is no real head of the Forest Department in Madras and the Director of Industries is not a business man. He is completely out of touch with what is going on in the Forests and we are ignorant of what is going on in connection with these industries.

11. I have now outlined the chief well known forest industries but in my opinion they hardly touch the fringe of Forest industrial commerce. The Madras forests are a large store-house of raw material, stocked with hundreds of kinds of woods, tans, dyes, gums, fibres and other material, which is practically unknown, and in this respect

the forests are hardly worked at all. Timber extraction is confined to a few well known species and the bulk of the wood is taken out for fuel but quite two-thirds of almost every forest remains untouched.

12. We are completely out of touch with the Scientific and Technical Department of the Imperial Institute (Question 21), which I believe to be entirely due to our want of a Research Department in Madras. From a recent article of Dr. W. R. Dunstan, C.M.G., F.R.S., I gather that a great deal of work is going on in conjunction with the Research Institute, Dehra Dun, but the results do not reach us in Madras. To illustrate this I refer to the remarks made on the Flosses of Cochlospermum Gossypium and Calotropis Gigantea both of which occur largely in Madras, yet no information regarding their commercial value has reached us. Similarly the following publications would interest us greatly—

(1) Constituents of the Indian Dye Stuff Kamala.
(2) Kamala, Part II.
(3) Colouring Principles of Ventilago Madraspatana.
(4) On the Colouring Principle of Toddalia Aculeata.

13. Our most crying-need then is for a Local Research Department similar to that of Dehra Dun and we have been asking for this for some years now.

But to properly develop our forest resources, we require a Forest Director of Industries as apart from the Agricultural Director. The Forest Director should not be a Forest Officer but a trained commercialist who should work in conjunction with the head of the Forest Department and the Research Officers. It should be his business to find out what are the chief requirements of the commercial world and to organise an industrial survey of all the principal forests where these materials are to be found (Question 25). He should also encourage industrial exhibitions (Question 31) which are of great value educationally.

14. But above all we want to encourage local industrial enterprise of which there is but little in Madras. This can, in my opinion, best be done by pioneer factories (Question 7). The Mysore Government have set a good example in this respect and have established a sandalwood oil factory which, I understand, is likely to prove a success. I have also given an example above of a case where an acetone industry might have been established. Other pioneer factories for pulping, pencils, and matches should be under the charge of the Director of Industries and run by commercial men and later on we should have fibre and floss factories and possibly many others.

The duty of Government in this matter is chiefly educational and I am of opinion that none of these factories should be permanent but should be handed over to private companies as soon as companies can be found sufficiently trustworthy to take charge of them.

15. The object of Government should be throughout to encourage local enterprise and to make Indian manufacturers aware of the vast sources of raw material that exist in the forests.

Large areas are at present untapped, consisting in a great measure of evergreen and semi-evergreen forests with an infinite variety of soft woods which should be suitable for pulp, pencils, or matches, and I would specially refer to the Tinnevelly forests which have a large supply of such material ready to hand with a fine supply of water. A necessary accompaniment to these proposals would be that we should be supplied with an adequate Forest staff which is one of the most urgent demands for the Madras Presidency.

ORAL EVIDENCE, 27TH JANUARY 1917.

President.—*Q*. I have got one or two questions to ask you. You say in paragraph 12 of your note that you are completely out of touch with the Scientific and Technical Department of the Imperial Institute and this you believe to be entirely due to the want of a Research Department in Madras. You understand also that a great deal of research work is going on in connection with the Research Institute, Dehra Dun, but the results do not reach Madras. Are not these results published regularly in your Forest Records and Memoirs?—*A*. We have them fairly regularly published, but the thing takes so long for research results to come to light, that there is a great deal of useful information in Dehra Dun and elsewhere that is never made available sufficiently rapidly.

Q. We have got a statistical account and of the history of the papers sent in for publication, and we have got the average time that is taken for papers to reach the public after leaving the pen of the officer. I cannot give you the figures from memory, but it necessarily does take a little time. What you really want is to be in touch with the actual progress of research?—*A*. Yes. We want to be working, at the same time with Dehra Dun, on the subjects which are suited to Madras.

Q. There was a proposal to have an Institute at Coimbatore in conjunction with the Forest College?—*A*. About four or five years ago.

Q. And that was dropped?—*A*. At the last Conference of the Conservators about a year ago, we sent up reorganisation proposals which included the whole of the research officers but they do not seem to have got any further yet.

Q. That is for the Madras Presidency?—*A*. Yes.

Q. If you developed your research institution here, there would have to be some system of correlation between your own and the one at Dehra Dun. Otherwise, your specialists here would be working on parallel lines, sometimes contradictory results would be obtained, and you would be suffering then exactly in the same way as you are now. Also, could you, in a Presidency like this, maintain the variety of specialists that would be required to deal with all problems of research? Take for instance, the commercial problems that you will have in conjunction with forest products. They cover a very wide area? Drugs, oils, perfumes and various other things require more or less a special treatment by chemical specialists. Could you maintain that staff here?—*A*. I should think quite easily.

Q. You mean from the financial point of view?—*A*. Yes. When the Forest Department was first started in Madras, it was supposed that the forests would not give any revenue at all. At the present time we are giving something between ten and fifteen lakhs, and that has been taken from us regularly. That shows that we could support such an institute in Coimbatore.

Q. You think that the whole of that money ought to be devoted to research purposes?—*A*. Not the whole of it, but if a little of it is applied to research purposes it would be something, We are perfectly certain that, if we had research officers, it would lead to so much more business in the Forest Department; and not only would research pay for itself but a great deal more besides. The Ambasamudram forest which I have been visiting is very large and is yet absolutely unworked. The outer fringe of it is being worked for timber and firewood, but the evergreen forest is absolutely unutilised and it can be utilised to great purpose. That is one small instance of what we could do, and it is much more so in the West Coast Forests and the Anamalais.

Q. We have evidence that under the present arrangements the forest officers are practically occupied all their time with routine duties and have no time for research work?—*A*. I think that is quite correct. We have small experiments going on in places, but there is no time, and no staff.

Q. And even where they know that forest products can be developed, they have not always the time, and not all of them have the qualifications to go into engineering problems necessary to get the forest material out?—*A*. I do not think that is part of the forest officer's duties,—it might be to organise transport and so on, but it is really a separate branch of engineering. Just at present we have got one engineer attached to the presidency but he is not what you would call a forest engineer at all.

Q. Do you want a special staff of forest engineers?—*A*. We shall have to train a forest staff for engineering. I have put before my engineer a scheme which I estimated would take two years and his estimate is that it is going to take ten. That is for one district.

Q. Would you have a very considerable increase of the staff in order to provide these forest engineers and keep them as forest engineers throughout the whole of their service?—*A*. I consider that it should be a special branch of the department. The man may be trained, first of all, as a forest officer and then go through a further course in forest engineering so that he may know what the forests want and at the same time have the engineering qualifications to train men up to work. I have already sent in a proposal that the forest engineering staff should be graded in the same way as our rangers so that rangers of certain grades who show a particular ability in engineering could be transferred to the engineering staff either temporarily or permanently.

Q. But that is reducing your engineers to a subordinate position?—*A*. I do not think so. My scheme is for the subordinate grades.

Q. Would you allow the engineers, or what you might call the assistant forest engineers to rise gradually to be district forest engineers and finally to be presidency forest engineers equivalent to the Conservator or the Chief Conservator?—*A*. I think that is what it would come to in the end.

Q. As a parallel series?—*A*. I think there must be a regular branch graded in the same way.

Q. And you could not transfer them again to forestry without making them universal specialists, of whom you have got too many?—(No answer.)

Mr. A. Chatterton.—*Q*. What is the actual area of the Madras Forests?—*A*. 19,839 square miles in 1914-15 annual report.

Q. What is the policy of Government in regard to the administration and conservation of forests?—*A*. I do not think they are regarded entirely as a source of wealth and therefore of revenue to the State, but I think that the general policy that ought to be laid down is that they should be treated, first of all for the use of posterity, and secondly, what I call the low class forests should be utilised for the use of the present

Q. What is the actual policy that has been followed by Government?—*A.* Nothing. There is no policy at all. There was one laid down in 1894 by the Government of India and the Government of Madras thought they knew better and declined to adhere to that policy. With our Forest Committee we have got very much back to the same lines as the Government of India asked us to follow in 1894.

President.—*Q.* What is this Committee that you refer to?—*A.* The Forest Committee in Madras. Four years ago, they appointed a Committee in Madras and the substance of their proposal was to classify the forests in the manner suggested in 1894.

Q. What was the constitution of Forest Committee?—*A.* It consisted of Mr. Horne, the Forest Member, one Forest Officer, one civilian and two Indians. The Committee has finished its labours. It was a temporary Committee which was appointed to enquire into the alleged grievances of the Forest Department.

Q. Or against the Forest Department?—*A.* Both.

Mr. A. Chatterton.—*Q.* The head of the Forests is a Member of the Board of Revenue?—*A.* Yes.

Q. And you have four Conservators?—*A.* Yes.

Q. Is there a considerable difference in the method of administration in each circle owing to the particular way of looking at things which separate Conservators have?—*A.* It is not only separate Conservators, but the conditions are different in each circle. The Western circle is a timber circle but the Central circle could not be considered a timber circle. Even from district to district forests differ. You cannot standardise them.

Q. The Forest Member of the Board is very frequently changing?—*A.* Yes. There has been a change quite recently.

Q. And with each change of Forest Member there must be a certain amount of break of continuity in the policy that is followed?—*A.* A great deal.

Q. Is that advantageous to the working of the forests?—*A.* Far from it.

Q. Out of these 20,000 square miles of forests in the Madras Presidency there is a very large area covered with jungle?—*A.* A good deal.

Q. And it should be cleared and re-planted to be regenerated?—*A.* Yes.

Q. You have been working with the idea of taking up this part of the work?—*A.* We have had ideas of how it should be worked for the last ten years.

Q. The Forest officers may be working, but the administration has not accepted them?—*A.* No. I do not think it has.

Q. How would you propose to deal with these vast areas that want re-stocking?—*A.* The first thing is to begin on a small scale and take up definite areas and see what we could do with them, and from the experience that we get from this we should be able to tackle much larger areas.

Q. Is it simply the lack of staff that prevents regeneration from being worked on a larger scale?—*A.* No. In a measure we employ our small staff on regeneration but we must have research officers for improving our methods.

Q. You want more staff?—*A.* We want staff all along the line.

Q. How is it that Government embarked on Malabar teak plantations? Was there a properly constituted Forest Department for teak plantations?—*A.* No. It was a matter of chance. The way it was started was this. There was a needy temple which was very much in debt and they wanted to do something to help it so as to keep it out of debt and the only way was to take these forests on lease and give a certain amount of money down. When the land was handed over a shrewd Collector started the teak plantation which was subsequently handed over to the Forest Department.

Q. Considering the expenditure that was incurred on the development of that plantation, has it turned out so far to be a commercial proposition?—*A.* Magnificently.

Q. To be developed into a better one?—*A.* Yes. At present the latest calculation which I saw the day before yesterday was that it was going to produce about Rs. 90 per acre per annum.

Q. Is there anything which prevents similar plantations and similar forest work being done in many parts of the presidency?—*A.* There is nothing to prevent us except want of staff, want of money, and want of opportunities. The outlay would be considerable, but that outlay would soon be recovered. As a matter of fact you cannot treat the whole of the forests with teak, but you will have to get a variety of trees and to find out what trees are best suited to each soil.

Q. You say that you are in agreement with the policy of selling the Casuarina plantations. Is that because the Indians have taken up this work themselves and are planting large areas?—*A.* Yes. In Trichinopoly and South Arcot I found that where we were planting one acre they were planting ten. If the ryots plant them of their own accord we think we have done our duty.

Q. Is it necessary that there should be any modifications in the method of granting leases for forest plantations by private individuals?—*A.* I do not think so. I think that, wherever land is suitable for planting, if the people are shown the right way they do not want any special grants.

Q. Would you be prepared to recommend that certain parts of the reserved forest area which want regeneration should be handed over to private people to work on lease or some terms of that kind? They might take up the actual planting work and work up the area and then share the profits with Government?—*A*. I have got a scheme something like that as regards sandalwood. I am making the Malayalees help us in all our forest operations and giving them a small share of the profits that is obtained in later years, but I do not think that it can be done on a very large scale.

Q. What I mean is this. In most parts of the country a certain amount of planting work seems necessary. The actual reserves of timber are not sufficient for the development of any large industrial undertaking, such as, wood distillation, and planting is desirable. On account of the comparatively limited staff which Government have so far on forest work, the Forest Department has to develop its industrial side by private agency. You lease out your forests in the form of coupes?—*A*. Yes.

Q. Would it be wise to lease out certain areas to private individuals to take up and plant them with a view to growing certain classes of timber and allow these leased areas to be in the hands of private individuals under certain necessary restrictions till the men could get a return on the money that they have invested on it? Would it be practicable to work it out and could it be done on a fairly large scale?—*A*. I do not think so. What about those places where it would be anything but a success.

Q. Is it not better that some thing of that kind should be done?—*A*. I do not think so. There are many points about forestry, and one is that you should give real rest, by which I do not mean that it should not be allowed to be treated solely for grazing. If you give the forest real rest, your soil improves and the land is rendered capable, of being planted, with a better growth of trees than you have at present.

Q. Is there much trouble from forest fires?—*A*. No. My circle is particularly free from fire. Last year was a very bad one, but I think that the year before only two per cent was said to have been fired. There are other parts of the presidency which are very bad, for instance, the Nallamalai forests of Kurnool.

Q. Is it a fact that there is insufficient staff to look after fire protection?—*A*. I think it is more due to the ill-will of the people and also to the fact that it is to the interest of so many people to burn our forests. The hill tribes want to move about freely and the graziers want green grass and hence they burn our forests for both purposes. There are so many people against us in the matter of fire protection. At the same time, I may say that it is chiefly due to the hillmen that our forests are saved from fire. The Malayalees have done some wonderful protection work for the last four or five years, and we have put portions of the forests under their charge.

Q. You say in the second paragraph of your note, "The existence of these large sandy wastes, coupled with a pernicious system of irrigation known as "spring channels" is a source of great danger to the community." Why do you say that spring channels are a pernicious system of irrigation?—*A*. They are taking the whole of the sub-surface water and draining it dry and creating a sandy desert at the top.

Q. The spring channel is draining the river basins?—*A*. It is draining the subsoil water. These channels go right across the country in the places which I am talking about.

Q. What rivers have you particularly in mind?—*A*. I am not talking about rivers at all. I am talking about the sandy waste near Bapatla of Guntur where these channels cross the sandy zone.

Q. What is the particular harm of this?—*A*. These channels are draining the whole of the country round of their sub-soil water and the sand at the top becomes looser and looser and eventually it will affect cultivation. We have an instance of it in Nazareth in Tinnevelly where the Forest Department has had to step in, and that will be the same in Bapatla. You are sure to have dunes formed unless you have the sand blown into the sea.

Q. Have you seen those big sand dunes on the Hagari?—*A*. Yes. That is not due to the same cause and I have not studied it sufficiently.

Q. Do you recommend that steps should be taken to stop this method of irrigation?—*A*. Yes.

Q. And where sand dunes are spreading, do you propose that the Forest Department should take up planting work?—*A*. I certainly think they ought to. I think it is one of their chief duties.

Q. There has been a great deal of trouble lately in the Northern circle owing to disease among palmyrahs?—*A*. Yes.

Q. Is there any special establishment in the Forest Department at the present time to deal with questions of this kind, or do they have to go to Dehra Dun for specialists who come down for a week or two?—*A*. We certainly have not any staff for the purpose. We have got one or two men who are well suited for that work. But we have got no staff at present and we have not been called upon to interfere in that matter.

President.—*Q*. In the Agricultural College?—*A*. I fancy that in the Agricultural College there may be men, but not in the Forest College.

Q. That is next door. Why don't you know what is going on in the Agricultural College?—*A.* The palmyrah tree business is not ours.

Q. The agricultural people are taking it up?—*A.* Yes, as far as I know. I have seen one or two reports. Somebody has been investigating the matter.

Mr. A. Chatterton.—*Q.* You have got spike in your sandal forests?—*A.* Yes.

Q. Have you any mycologist?—*A.* We have got no special staff at all in that way. Spike is one of the things that I am taking up myself.

Q. The department appears to be very much understaffed and you have not enough people to deal with the problems that come along?—*A.* Yes.

Q. Taking these 20,000 square miles of forests as a whole, looking upon it as a property which should be developed for the benefit of the whole community in every possible way, is it right to assume that the scientific commercial exploitation of these forests will be the best way in which to improve them so that we may hand down to posterity a gradually improving property?—*A.* (See next paragraph).

President.—*Q.* The only question is how we are going to do it? By spending a very much larger amount?—*A.* My idea is that we should get not 20 lakhs but 200 lakhs if our forests are properly worked. We should improve the forests and at the same time improve the revenue, but it is the improvement of the forests that I want first.

Q. By improving the forests you will ultimately improve the revenue very largely?—*A.* Yes.

Hon'ble Sir R. N. Mookerjee.—*Q.* How do you propose to work your sandalwood oil in conjunction with Mysore? You say you have not enough material to start a sandalwood oil factory?—*A.* I have been enquiring into the matter since, and we have got enough to start a sandalwood oil factory of our own. I have also been enquiring into the Mysore factory and I find that they have got a factory for 300 tons. I do not think that it is a practical solution of our problem that we should go to them. I have suggested to a big purchaser of our sandalwood in Bombay that he should get up a factory and he is considering the question of setting up a distillery of his own in a place that I have chosen.

Q. Have you gone further into the matter?—*A.* I have got a few figures here that we have procured and we should start very much on the same lines as Mysore, with about 300 tons a year and the business should pay us well. My District officer of South Vellore who is well versed in sandalwood dealings tells us that the working expenses including the cost of establishment and the interest on capital at the Bangalore factory amounts to Rs. 4 a pound and the net revenue that is derived is Rs. 36.

Mr. A. Chatterton.—*Q.* How was your Forest officer able to get these figures?—*A.* I am not prepared to tell you.

President.—*Q.* Have you attempted to get information from Mysore with reference to their sandalwood oil?—*A.* We went directly to Professor Sudborough, and he gave us this information.

Q. And you have been given every access and every reasonable help?—*A.* Yes.

Hon'ble Sir R. N. Mookerjee.—Have you got figures for the installation of a sandalwood oil factory?—*A.* I can get you the figures, but I have not got them at the moment.

Q. Are you going to advise the Government to set up a factory or to leave it to outsiders?—*A.* If we could get one of our really responsible purchasers to do it, it is all we require. We certainly ought to have better sales for our wood than at present. According to the oil value under the estimate I should get Rs. 4,000 per ton. Our purchasers up to this year were giving us only Rs. 1,000 a ton, and this year it has been Rs. 1,500.

Q. Would it not be advisable for you to advertise?—*A.* I cannot very well advertise without the permission of the head of the department. At present it is only a matter which I have talked about to the purchasers. We want to know what action the Government is going to take in this matter and to do that I have got to place figures before them.

Q. You are going to submit proposals to Government before you inform the public?—*A.* Yes. I want to find if any people are ready and willing to take up this factory first of all, and in doing so I want to go to our biggest purchasers and ask them because they are the people who ought to be considered before others.

Q. And you will be competing with the Mysore State?—*A.* It would not be competition. We cannot afford to compete with Mysore. The Mysore yield of wood annually is about 2,000 tons and ours is about 300. Ours is going to increase and the Mysore one is going to decrease, because they have got spike so badly in Mysore.

Q. Is sandalwood a monopoly of the Madras Government?—*A.* No.

Q. It is a free tree?—*A.* It is what they call reserved tree, and there are special rules for its protection.

Q. You can grow sandalwood in your own compound?—*A.* Yes.

Q. If ultimately it comes to be a business proposition you will have to sell your forests by public auction?—*A.* I do not think we will sell the forests by auction.

Q. The sandalwood trees belong to Government and you cannot negotiate with one party and you will have to put the trees to auction. Suppose you negotiate and settle terms with a man and he starts a factory and a third party comes, and it is only a matter of raising the prices?—*A.* That is quite true, but these men ought to be given facilities for purchase if they take the trouble.

Q. Could you give them facilities?—*A.* Yes, if they started what is really a pioneer factory.

Q. All along I have understood that the forest officer must sell by public auction?—*A.* That is the rule at present, But we are talking of a hypothetical case at present whether any one will come forward and if so I should say that he ought to be given facilities for doing so.

Q. And you hope that you would get sanction from Government?—*A.* I cannot say. I think it would be a very good thing if we did.

President.—*Q.* What date was it when you got this information from Bangalore?—*A.* About the 21st of this month it reached me.

Q. And the officer you sent for enquiries, was he a chemical officer?—*A.* No. He is very largely interested in the sandalwood question and has been for many years working under me and he went up to Dr. Coleman and I asked him to take the opportunity of going over the factories and I gave a letter of introduction to Professor Sudborough.

Q. What has he got to do with the factory?—*A.* I understood that he had charge of it.

Q. Have you made any application to the officers of the Mysore Government for information?—*A.* No. I have not actually made any for that information. I made some to the Mysore Government on other subjects connected with sandalwood and they were most unsatisfactory. They refused to tell me who their merchants were, with whom they were dealing, which I could have got by going to the people themselves direct.

Q. That is, the Mysore Forest Department?—*A.* Yes.

Q. But it has been stated that applications from responsible officers to the Mysore Sandalwood Oil Factory had been made and refused?—*A.* I understand that one of our officers has been refused.

Mr. A. Chatterton.—*Q.* I am in a position to state that there has not been a single refusal. The applications which are said to have been made have always been made to people who had no connection with the factory ever?—*A.* I do not know.

Sir F. H. Stewart.—*Q.* In reply to the President you developed your ideas about the engineering branch of the Forest Department, and in your written evidence you make reference to the need of a Forest Director of Industries. Would that take the form of a separate branch of the Forest Department? How would you get commercial men to go into the Forest Service?—*A.* That is dealing with questions that I hardly considered at the time, but I wanted a man to be really in touch with the Industrial Department much more than we are at present.

Q. You see the need for the development of forests on the commercial side?—*A.* Yes.

Q. And you think that an industrial side might be added?—*A.* Yes, as part of the present Industrial Department. At present that Department seems to think that industries consist only of agricultural industries, and what I want to do is to develop forest industries. As a matter of fact, something has been done in that line, because they have now appointed an officer in Madras to enquire into and make the surveys that I have mentioned in my written evidence.

Q. Would he be a man to whom business people wishing to get into touch with forest industries would go?—*A.* I cannot really say. He is my brother and I do not think I should say too much about him. He is now retired and they have now re-appointed him on this special business. He has always taken a great interest on the economic part of forestry and it is quite possible that he may be able to promote some development.

Q. Would he not require a regular staff under him? It is a big proposition?—*A.* I think he would get into touch with the District Forest officers and ascertain what places want industrial survey and he would then arrange with commercial men in what way they may be developed commercially. One does not know how far the idea would go, whether we should set up pioneer factories ourselves departmentally, or whether that would be done through the Industrial Department.

Q. Would he have anything to do with the collection of minor forest products and things of that sort?—*A.* Of course, it would come to that. He would have to arrange how we should sell our minor products. At present there is a tremendously large field for an enquiry of that sort.

Q. If you instituted a sort of commercial branch of the Forest Department would you be able to eliminate the small contractor?—*A.* We could do so quite easily, I think. What I should do is to make them collecting contractors rather than buying contractors. If a special industrial product is there we would separate that from the general minor products contract and make him a collector.

Q. That is the suggestion that you make in reference to gallnut for tanning purposes?—*A*. Yes.

Q. You would separate that from other forms of minor produce?—*A*. Yes.

Q. You urge the formation of a research institute in the Madras Presidency?—*A*. Yes.

Q. Because Dehra Dun is too far off?—*A*. That is one reason. The sylviculturist has only once been able to give two months to this presidency and he cannot see anything in that time.

Q. But supposing a part of the surplus revenue from forests were devoted to the development of forests and your department was much more fully staffed and also Dehra Dun was much more fully staffed, would there still be any need, in your opinion, for a provincial research institute?—*A*. Yes. We must have provincial research institutes.

Q. You are not against a central one, and you think you could keep in touch with it?—*A*. We can always be in touch. The Conservators go up to the triennial meeting of the Research Institute at Dehra Dun. They have a Conference of Conservators there from all parts of India, and in this presidency one Conservator is usually asked to go up and represent this presidency at that Conference. In dealing with the programmes you will have a separate programme here and yet correlated to the Dehra Dun programme.

Q. That is only once in three years?—*A*. That is all you want for the drawing up of the programme to see what people are doing. We should then draw up our own programme for three years and see that nothing overlaps.

Q. You next refer to match making, and you say, " But for an accident, Messrs. Khuddus Badcha & Co. would have established a factory twenty-five years ago in Madras and we should have been able to clear our forests of many of our soft woods." What happened?—*A*. The accident of having a Botanical Conservator who referred them to the pines of the Himalayas to start a match factory in Madras.

Hon'ble Pandit M. M. Malaviya.—*Q*. Apart from the question of distance to Dehra Dun, do you think that Madras is a large enough province to require a research institute in view of its large forests?—*A*. I think there ought to be one for each circle. At any rate, there should be one for the presidency.

Q. You speak of the match making industry. Are there many woods which, in your opinion, are suitable for match making?—*A*. I think there are a great number of woods here suitable for match making.

Q. Has this matter been investigated?—*A*. Some years ago we found two most suitable woods which could be supplied from the Kurnool forests, and now, I believe, they are setting up a factory at Punalur on the Travancore side.

Q. You have found woods suitable for pencils?—*A*. A good number of woods suitable for pencils.

Q. Are these facts notified to the general public?—*A*. No. At present they are notified to the Industrial Department and they notify them in their bulletins. There was an industrial bulletin the other day as to the suitable woods for matches.

Q. You are making experiments on pencils?—*A*. Yes.

Q. You think that there should be a regular gazette or regular bulletins periodically issued to give information of the kind that you have in view?—*A*. Most certainly.

Q. And not only in English but also in the vernacular?—*A*. I cannot say that. The question is whether, if they are published in the vernacular, sufficient people will read them.

Q. You know that the number of those who read the vernaculars is many times more than those who know English?—*A*. Not when you are dealing with a subject of that sort.

Q. Are not many of those who are carrying on trade and industry among Indians not sufficiently acquainted with English?—*A*. I think all the Madras merchants are or the greater portion of those that I have got to deal with are English speakers. It is very easy to get anything translated in Madras.

Q. Instead of putting them to the trouble and expense of translating it, would you not issue it in the vernacular?—*A*. That is really a question which I cannot answer. It is really a matter of advertisement and perhaps commercial men might advise you better on the subject.

Q. Don't you think that when the researches have been made and published in the bulletins of the department or in some other publication, the executive officers of the Government should settle the terms of sale, and the supply of these articles to trade?—*A*. I don't quite understand what you mean by ' executive officers.'

Q. Revenue officers?—*A*. I would not let them to come near the forest.

Q. You would require a forest officer to deal with the sale and the supply of these products to those who want them for trade?—*A*. Yes.

Q. Would you recommend a system of advertising prices and all that, or leave it entirely to the individual to deal with the things as they come in?—*A*. Our big sales are advertised largely. They get into the principal papers; practically they are known all over the southern part of India. I can't say if the sale notices go to Calcutta and elsewhere, but they certainly go as far as Bombay.

Q. You suggest in the case of gallnuts there should be departmental collection. Does not departmental collection oftentimes inflict a hardship upon people who are living near the forests?—*A*. Much less so than any other way of collection.

Q. You can say from your experience that people will prefer it to collection by contractor?—*A*. I cannot say because we have had the contract system for some years. When I took up departmental collection of gallnuts in the Coimbatore district, it was far more satisfactory.

Q. How long have you held the office of Conservator of Forests?—*A*. Since 1911.

Q. Have you got several higher grade subordinates under you? Any Indians among them?—*A*. Yes.

Q. What posts do they occupy?—*A*. District Forest officer.

Q. How many under you?—*A*. Five Indians and three Europeans.

Q. Where were these Indian officers educated?—*A*. They have been educated at Dehra Dun so far. I think the whole of them have been educated at Dehra Dun.

Mr. C. E. Low.—*Q*. When you talk about wood being suitable for pencil making or match making, that, I suppose, means that it looks like the kind of wood which may satisfy the general requirements and possibly the Dehra Dun people might have asked the factory people to try it?—*A*. I do not regard any wood as suitable until it has been proved. You send a sample to the merchant who is asking you for matches or pencils and it is for him to prove whether it is suitable or not.

Q. Here is an officer coming up on one side and saying that there are a large number of suitable woods, and on the other a number of people who are in the match trade and have lost a lot of money over it, saying that they cannot get suitable species. Where is the difficulty?—*A*. I think the difficulty is what I was talking about just now—the regeneration of suitable woods is so distributed that you have your match woods covering a large area of forest.

Q. Does it not seem as if Government ought to go a bit further than they have at present, and put up, I do not say a match factory, but some sort of plant to show how far these things are suitable?—*A*. I certainly think it ought to. The Government wants it to be in Madras, but I think it ought to be set up in some suitable place near the forests.

Q. With an extensive plant showing how these things are made?—*A*. Yes.

Q. You think the provision of charcoal for Madras is sufficiently important for Government to take up the thing on a big scale?—*A*. Do you mean charcoal and not acetone?

Q. Apart from any question of bye-products which, of course, comes in naturally?—*A*. I should rather doubt if it would be worth while to take up the actual manufacture of charcoal on a large scale. I have had a good deal of experience.

Q. I mean the Government taking steps to produce it?—*A*. To produce charcoal on a large scale you must have an enormous number of kilns as the Indian ways are defective.

Q. Are you in favour of Government starting a wood distillation plant?—*A*. Yes. I would rather the private individual would do it, but I want somebody to take it up.

Q. Supposing you have got a number of these research institutes all over the place how do you propose to correlate their activities, so that they do not overlap? By a conference of Conservators?—*A*. Yes. If they had them in every province, it might be possible for a biennial or annual conference.

Q. That was the device adopted in the Agricultural Department and it is proving less and less satisfactory. Don't you want the control of scientific work and scientific men by scientists?—*A*. Yes.

Q. If you have a number of provincial institutes each controlled by local conservators all over India, do you think that is the best way to adjust things asking the Conservators to meet once in two years?—*A*. I think it is quite easy to control it. You know what is going on in the way of research in your own province, and you settle the general programme, etc.

Q. You have never controlled any research work hitherto?—*A*. No.

WITNESS No. 231.

MR. H. B. BRYANT, *Conservator of Forests, Central Circle, Madras.*

WRITTEN EVIDENCE.

I have been asked by Mr. P. M. Lushington, Senior Conservator of Forests, in the Madras Presidency, to submit evidence to the Commission on matters relating to the Forest Department in this Presidency in connection with forest research work and industrial enterprise.

2. *Increase and improvement in the forest organization essential.*—To commence with I must give it as my considered opinion that no forest research work of any value is possible under the existing conditions of the Forest Department in the Madras Presidency. The Department is so seriously undermanned that it is quite impossible for any of its officers to engage in serious research work without utterly neglecting the ordinary duties which are expected of them. As a Forest Officer of 26 years' service I hold most strongly to the opinion that there is an immense amount of latent wealth in the forests of this Presidency which can and must be developed in the future. In order that such development may be rendered possible the very first thing to do is to endeavour to place the Forest Department in this Presidency on a footing of complete and up-to-date organization, so that the department will be capable of thoroughly opening out the forests entrusted to its charge and thus preparing the way for economic research and industrial development. Much no doubt has been done in the past, but there is still an enormous amount of work to be done in the future and it is impossible for the department to make any more substantial progress so long as the Government is content to keep it in a constant state of struggling inefficiency which is the case now and has been for many years past. I have entered somewhat at length into the crying necessity of properly organising the department in the Presidency in the first instance because I feel very strongly that without such proper organization, forest research work which will have to lean on the Forest Department from the very beginning could not possibly make any real headway without it. Hence I make no apology for having done so.

3. *Establishment of Forest Research Institute necessary.*—Assuming that the Department will be placed in a thoroughly organized condition with regard to the establishment required for carrying out the ordinary duties expected of it, the next necessity is the establishment of a properly equipped local Forest Research Institute. Incidentally I may mention that the proposal was put forward to build such an institute in connection with the Madras Forest College recently constructed but this was vetoed by the Government.

Such an institute is essential if any real progress is to be made in forest research with a view to convert into economic use many products of the forests which are now lying latent therein. An institute of the kind must be staffed with the best trained expert heads and hands procurable, and sufficiently good salaries must be paid in order to detain such men when appointed in their posts for lengthy periods. Such a local Forest Research Institute may be subject to a central Research Institute; indeed I can see no reason why there should not be a Central Institute of Research, Commerce and Industry established in the country with which could be connected all local Research Institutes for whatever purpose, and if this were to be accepted, there would be a sufficient number of appointments to be filled which would amply justify the formation of an Imperial Research Service in this country from which the Central and Local Research Institutes could be staffed.

To expect the average Forest Officer with the multifarious duties which are already imposed upon him to be able to dive into research work with any hopeful results is to expect an impossibility. They certainly have not the time even in cases where the knowledge and the will may exist; but nevertheless if only the department were to be thoroughly well organised, and a trained and sufficient staff were to be provided for carrying out the ordinary duties of working, developing, and protecting the State forests of the country so that each officer was given a fair standard of work to perform, Forest Officers would, I have not the slightest doubt, render most valuable assistance in the way of forest research work of their own accord and be ever ready to submit their ideas, views, and specimens of any product deemed of possible economic value to the Local Research Institutions for investigation and certainly it would be right and proper to expect them to do so. Under present conditions such a thing is altogether impossible. The Department is undermanned and overworked all down the line, and whatever little organisation it has possessed or now even possesses, it has years ago outgrown and it is literally at the present moment, and has been for some years past, kept in a constant state of struggling inefficiency which before long, if nothing is done to avert it, will land it in a very unhappy state of inanition.

4. *A sound and thoroughly efficient Forest organization is necessary in order that Forest Research itself may produce good results.*—For the improvement of economic industry in this country forest research is imperative, and for the proper conduct of forest research, a thoroughly good and efficiently trained organization in forest administration is absolutely essential and this at present is not in existence in the Madras Presidency; and in my considered opinion it is never likely to be brought into existence under present conditions under which the Board of Revenue is made the head of the Forest Department in the Presidency, nor until the department is given a professionally trained Forest Officer as its expert head who should be made responsible to Government direct, and who would have some chance of being listened to in connection with matters connected with his professional department.

5. Further in my view the Government would be well advised if they made up their mind to forego all surplus revenue made by the Forest Department in this Presidency for a period of the next 20 years, and instead of taking it out of the forests and utilising it for other purposes as they are now doing, they should spend it on the proper maintenance, working, opening out and development of the forests themselves. From the point of view of sound forest policy and from the present degraded and undeveloped state of many of the forests themselves the Government is quite unjustified in taking so much revenue from the forests and putting so little back therein.

6. The surplus revenue derived from the forests might well go to form two funds, viz.:—

(1) The Forest Capital Reserve Fund.

(2) The Forest Economic and Industrial Development fund.

No. 1 fund would be used to finance capital work such as expensive ghaut roads, trunk roads, tramways, buildings, saw mills, rope-ways and the like, for the purpose of working the forests and transporting forest produce from localities which are at present inaccessible, and No. 2 fund would be utilised to finance the operations in connection with the establishment of Forest Research Institutes and the pioneering of new industries in connection with products derived from the forests themselves.

7. Without liberal expenditure these things are impossible. With it there is very little that is not possible. Liberal expenditure properly expended on the Forest Department and forest research will yield magnificent results; of that I am personally absolutely convinced; but no such results can be looked for so long as the department is starved in both men and money as it has been hitherto.

8. If we are to make progress in developing the forests more rapidly the Government must be prepared to sink more capital in them and that is just what they hitherto have refused to do. It cannot be reasonably expected that private enterprise will sink the necessary capital in forests which are the property of the State: it surely must clearly be recognized that it is the duty of Government itself to do so, and if it is done there can be no reasonable doubt whatever that eventually Government and the people will reap a full reward for such action.

9. With regard to research generally I think that it is very necessary that all research work should be co-ordinated not only to prevent unnecessary overlapping of research activities but that these activities should be so co-ordinated as to lead to the best results obtainable. For example a Forest Officer comes across a plant which in his opinion is likely to yield a chemical or drug which may prove of immense commercial value. He sends it to the local Forest Research Institute for investigation. The investigation proves that there may be something in it and it is referred to the local or central Chemical Research Institute for further investigation and the opinion is still further confirmed that the plant is of great value.

10. There should then, I submit, be some great Central Bureau of Research, Commerce and Industry to which the opinions of the local research officers should be sent with a view to further investigating and pushing the matter beyond the stage of suggestion into practical industrial enterprise, and ascertaining what likely markets are to be found for the product discovered and on these investigations proving hopeful, steps should be taken to set up the necessary plant to demonstrate by actual experiment that there is likely to be commercial profit in the matter.

11. Some ten years ago a Conservator of Forests was called upon to go into a question of the supply of wood for the purposes of producing acetate of lime required in connection with the manufacture of cordite in the Wellington Cordite factory. The necessary investigation was made and the matter duly reported on. There is no reasonable doubt that the Forest Department could supply almost unlimited supply of wood for dry distillation which would yield charcoal, acetate of lime, glycerine and other products, but to do the dry distillation a certain amount of capital is necessary

to purchase the plant and organise the industry. The ordinary primitive methods adopted for making charcoal in this country are very wasteful. They produce a certain percentage of charcoal it is true but everything else runs to waste.

12. It is a fact that much of the forests in this Presidency would benefit greatly by being cut back, if the felled area could be properly protected during regeneration. But in order that this could be done there must be a regular demand of some kind for the felled produce and there must be a sufficient forest establishment to cope not only with the felling operations but also to properly protect the felled areas during regeneration.

13. Some years ago the Forest Department introduced into this Presidency the planting of casuarina for fuel. This tree is chiefly grown on the east coast districts not far from the sea and it likes a sandy soil. The plantations made by the department proved successful and since then the Government has ruled that, as the department has pioneered the growth of casuarina into the country and demonstrated satisfactorily that it can be successfully grown at a profit, the operations by the department should be discontinued and accordingly they have been stopped. It yet remains to be seen whether the policy of stopping the operation will be justified in the future by the necessary private enterprise expected being forthcoming to grow this tree and increase the output in firewood. Personally I think the question is not free from doubt. At any rate the departmental operations in this direction have now ceased.

14. The department could if necessary grow almost unlimited supplies of such trees as casuarina on the coast, and eucalyptus on the hills, and the outturn need practically only be limited by the extent of land available for the growth of each, were such wood required for any permanent industry such as dry distillation of wood for the production of charcoal, acetate of lime, etc.

15. I am not advocating that it is advisable that the department should undertake such work of planting unless it be for the special purpose of feeding some such industry with its regular requirements, but I have no hesitation in giving the opinion that the department *could* do it if necessary and if it was placed on a proper organised basis.

16. I would in the first instance much prefer to see the forest organization so extended as to be able to develop and open up the natural forests already under its charge and work them for the benefit of the community at large both from an industrial and commercial point of view.

17. Were this to be seriously taken in hand forest research should and would proceed along with it, and therefore proper organization for forest research should be brought into existence at the same time. The Forest Officer feels and knows that in his forests there lies enormous potential wealth which is now latent and cannot be got at owing to insufficient development and inadequate organization: little or nothing is done by Government to encourage sufficient development or proper organization for the department.

18. It is some 10 to 15 years at least ago since the Government recognised how shockingly the department is undermanned, as can be seen from the extracts, sent herewith, of the Government's own remarks in the Annual Forest Administration Reports since the year 1902-03, but during all the period which has elapsed since then little or practically nothing has been done to increase and improve the organization of the department to enable it to be in a better position to execute its duties and make good progress, and it is under such disheartening conditions that for years past the department has struggled on against inefficiency which is bound to overtake it sooner or later unless circumstances greatly alter and the work of the past, and the organization which has already been built up thereby, will be lost and break under the strain and the department will have to begin its work all over again.

19. If the department is reorganized every period of years according to the progress and advance it makes in developing the forests under its charge and tapping their resources, the department is likely to go on growing in organization and numbers for the next half century at least, but there seems to be a deeply rooted objection on the part of Government to permit the growth of the forest organization in this country to keep pace with the times and consequently the department is kept back and its advance is greatly hindered and retarded by the Government's lack of sympathy in the department's efforts, and its failure to properly realise the real needs of the department in the way of increased establishment and improved and enlarged organisation which the department must have as progress is advanced. In my opinion the wonder is, not that the department has accomplished so little, but that it has been able to accomplish so much in spite of the enormous difficulties against which it has had to contend, and the little support and encouragement it has hitherto been given by its own Government.

Forest transport.

20. Deficiencies in Forest transport are very numerous indeed. There is not a single district in the circle of which I at present hold charge wherein forest transport has as yet been properly facilitated by the construction of roads in order to make the forests accessible for purposes of developing them. Spasmodic attempts have from time to time been made in certain localities to render certain small portions of the forests accessible and workable by constructing forest roads and bridle paths both in the forests and outside of them, but whenever and wherever such operations have been attempted there are always great difficulties put in the way, such as lack of funds, to meet expenditure, no establishment to supervise the works of construction, acquisition of lands through which such roads must go, and lots of other difficulties which need not here be mentioned but which all have a tendency to delay the necessary road making. Sometimes the argument is used that it is not the business of the Forest Department to make roads, but that this work should be left to the Local Fund Department or Public Works Department rather than that the roads the Forest Department requires should be constructed by itself, for its own use, and such being the case many a Forest Officer has had to be content to sit down and inspect his forests through a telescope in the absence of any communications to and through them which would not only enable him to thoroughly inspect the forests but also to work them and transport forest produce from them. The spirit of proper enterprise has undoubtedly been lacking in this respect on the part of the "powers that be" and where in a few cases some officers with pioneer instincts in them have endeavoured to break down the barriers and difficulties to extensive opening out by road and bridle-path construction, these efforts have only lasted so long as the pioneer spirits remained in the particular localities and no continuity of policy has been carried out, and as often as not such an officer who has effected such construction work has had to break and almost defy Government rules and regulations in order to carry out his objects. Localities are personally known to me whence actually a less outturn is now being brought out from the forests than was the case no less than 25 years ago, simply because export roads and means of transport have not been improved or extended.

Railway transport.

21. I have in many cases had personal experience of a serious shortage of trucks and waggons in the matter of a large firewood supply to certain towns and localities. In such cases, large quantities of fuel get stored and held up, great loss in dryage is incurred, proper working of the forests according to the working plan is held up. This tends to raise the price of the commodity to the public, while it diminishes the price realised by Government in the forests because dealers are afraid to bid for working such produce as fuel when they never know when transport will be seriously interfered with by curtailment in the supply of railway trucks and waggons. This instance of disability is often a very real one in the case of large operations in the supply of firewood.

Jail industries.

22. Personally I consider that Jail industries should be encouraged in every way that is possible, especially in the way of supplying the needs of Government departments. Some years ago the Jail Department used to supply departments such as the Forests, Police, etc., with tents and also the public as well. The tents were strong and of excellent make and infinitely superior in every way to any tents supplied by the Muir or Elgin Mills from whom the tents have been obtained since the Jail industry was given up. There are jail made tents in my circle now made 10 years ago which are in far better condition than those supplied only 3 or 4 years ago by the private firms, and I think that there can be no doubt that the transfer of supply from the Jail Department to that by private firms has proved very poor economy for Government in the long run. I have recently represented this matter to the Board and Government.

23. To sum up, what in my humble opinion is needed for the present and immediate future are the following:—

(1) Greatly increased and improved organization of the existing Forest Department.

(2) Establishment of local Forest Research Institutes with the employment of the very best experts who are obtainable.

(3) Establishment of a great Central Bureau of Research, Commerce and Industry in India again with the employment of the very best experts obtainable.

(4) Lastly, but by no means least, there must be more intelligent sympathy with the real objects and aims of Forest conservancy in this country on the part of Government, and a little less sympathy towards the ignorant susceptibilities of the peasant population. Forest conservancy can never really hope to be popular in any country, still less in a country like India where the education of the people is so backward; and that most fallacious pose that the Revenue Officer of the country is the saviour and protector of the ryot against the oppression of the Forest Officer must be altogether swept away and a harmonious working together of both officers must be insisted upon.

The Forest Officer if only the truth were realised is a far more real friend of the inhabitant of this country than the Revenue Officer can ever be. I do not expect this fact to be recognised, but in my opinion it is a fact nevertheless.

For a technical department like that of the Forests in order to make real progress, it is essential that the department should have its own professional head in each Presidency. Presumably it would not be considered right and proper if a civilian were to be appointed as Surgeon-General, and yet the analogy with reference to the Forest Department is not so very far wrong.

Extract from the administration reports regarding proposal for strengthening establishment.

Year.	Board's proposal.	Government Order.
1902–03	Nil ..	His Excellency the Governor in Council has again to deplore the unsatisfactory conduct of the subordinate executive and protective staff. There appears to have been no improvement since last year, but rather the contrary. It is to be feared that no real progress will be made until the controlling staff has been increased, and that question is *now under consideration.*
1903–04	Nil ..	The Government have also suggested to the Board the advisability of increasing the number of rangers, since the present establishment seems insufficient to supply the needs of existing ranges, and it is undesirable to place junior officers in the responsible position of sole charge of a range.
1904–05	Nil ..	The Government still await *the Board's detailed proposals for increasing the number of rangers' appointments* (G.O. No. 170, dated 24th February 1905). The question of improving the personnel of the ranger class and the subordinate grades of the Provincial service has recently formed the subject of correspondence with the Government of India.
1905–06	Nil ..	The sanction of the Secretary of State has just been received for the entertainment of additional rangers, and the strengthening of the upper controlling staff is equally necessary as a complement to this measure.
1906–07	Nil ..	. . . But the efficiency of the department is undoubtedly greatly reduced by the inadequacy of the executive staff both in numbers and training.
1907–08	. . . The Board cannot look for any real improvement in this direction until the controlling staff is strengthened. Proposals for augmenting it are under the consideration of Government of India.	. . . Since the close of the year, proposals for permanently increasing the subordinate staff have been sanctioned by the Secretary of State. *Note.*—This merely converted temporary into permanent and was no real addition at all.

Year.	Board's proposal.	Government Order
1908–09 ..	As the Board observed in the previous year's review, little real improvement can be expected until the controlling staff is sufficiently strengthened to render closer supervision possible.	Nil.
1909–10 ..	The Conservator, Southern Circle, points out that it was impossible to keep the ranges properly manned owing to the large number of rangers on sick leave and the absence of any reserve to replace them. This remark applies equally to the other two circles. An increase both of the controlling and of the subordinate staff is the most crying need of the department. The work is increasing year by year and the establishment has long ago failed to keep pace with it. The present state of affairs makes proper work impossible. *The Board is about to approach* Government with a request for an increase.	The Government note with pleasure the testimony borne by the Board of Revenue to the good work done by the Conservators and the superior controlling staff of the department, and are glad to learn that the work and conduct of the subordinate executive and ministerial establishments were fairly satisfactory. As observed by the Board of Revenue the strength of the department is inadequate for the proper performance of all the work it is called upon to perform, and the preparation of working-plans, sylvicultural operations and the development of roads and communications are in consequence retarded, while forest beats and ranges are too large to be efficiently protected. If the proposals made by this Government for strengthening the controlling staff of the Forest Department in this presidency are accepted by the Secretary of State to whom they have been submitted, much-needed relief will be given to the superior officers of the department and the Forest College at Coimbatore can be brought into existence without further delay. The Board's proposals for strengthening the subordinate staff are awaited.
1910–11 ..	The conduct and work of the protective staff continued to be open to criticism but much improvement cannot be expected until the executive establishment is strengthened and the size of beats is reduced. Proposals for strengthening the subordinate establishment sufficiently to meet existing needs were called for and have been *submitted by Conservators*. The Board has these proposals at present under its consideration and will at an early date submit them to Government with its own recommendations.	It is not probable that any further considerable addition to the Imperial and Provincial staff will be obtainable for some time while no large increase in rangers is likely to be possible until the Forest College, which it is hoped to open at Coimbatore in July next, has been at work, long enough to increase the supply of trained candidates. In these circumstances, the Government would hesitate to sanction any great addition to the low-paid subordinates' establishment, unless they are fully satisfied that the existing executive staff is sufficient efficiently to control them.
1911–12 ..	The conduct and work of the subordinate executive and protective staff can hardly be called satisfactory as a whole. Yet much excellent work has been turned out under great difficulties and the Board does not intend to imply the disparagement of the whole on account of the delinquencies of a part.	The consideration of the proposals submitted by the Board for the augmentation of the subordinate staff of the department has been *protracted* pending the receipt of the report of the *Forest Committee and also of a report* from the Inspector-General of Forests who has recently been examining the question of the comparative costliness of forest establishments in this presidency.

Year.	Board's proposal.	Government Order.
1912–13 ..	The result of the year's work was, as shown in paragraph 32, a net surplus of 10¾ lakhs or nearly three lakhs more than the figure of the previous year. This result was to a considerable extent due to the substitution of private for departmental agency in the distribution and felling of fuel. The total gross revenue was slightly less than in the previous year and the net result demonstrates the advantage of leaving the supply of the market to private agency. It must, however, *be remembered that the main object of forest conservancy is not to amass revenue but to conserve for the public, both for present and future generations, the valuable property enshrined in the forests.* For this purpose money has to be freely spent on establishments, on communications, and buildings and the present establishments are in many cases hopelessly inadequate for the duties required of them. A scheme for strengthening the subordinate staff has *now for a considerable time been before Government.*	Mr. Beadon Bryant observed in his recent note that the position of the department in regard to working-plans is not satisfactory. Working-plans were prepared for a much larger area in 1912–13 than in 1911–12, but the Government are aware that *without additional establishment little* can be done in this direction and the question of obtaining such establishment is now engaging attention.
1913–14 ..	In accordance with Mr. Beadon Bryant's recommendations, proposals for the reorganization of the Forest Department were called for, and were submitted during the year under report. These proposals deal with the controlling, executive and protective staffs, and involve a considerable increase in the annual expenditure. It was pointed out by Mr. Beadon Bryant that a low proportion of expenditure to revenue could not be considered as a sign of satisfactory forest management. In his opinion the establishment entertained on the forests of Madras was often totally insufficient for proper working and protection, for the regulation of grazing and for the economical carrying out of improvements. Forest districts, ranges and beats were in many cases found to be too extensive for efficient management, while the existing staff is inadequate to fill even the present scale of appointments. The reorganization proposals *now before Government are devised to meet* those objections and in each district detailed inquiries are being made as to the redistribution of charges.	The Government observe with regret that Conservators generally speak in very unfavourable terms of the conduct of the subordinate forest staff. *This unsatisfactory state of affairs is largely due to the want of adequate controlling staff*, to the under-payment of certain classes of subordinates and to the number of temporary hands employed, defects which will be lessened, if not removed, when financial considerations make it possible to give effect to the proposals for the reorganization of the department which are now engaging the consideration of Government.

Year.	Board's proposal.	Government Order.
1914-15 ..	The proposals made by the Board in the previous year for the entire reorganization of the Forest Department had to be *withdrawn* as requirements in *the matter of the subordinate staff were found to have been underestimated*, revised proposals will very *shortly* be submitted to Government.	The Government await the revised proposals which the Board is about to submit and trust that financial conditions will improve sufficiently to admit of the early introduction of the reorganization which *by common consent is necessary*. Apart from the crying need for additions to the superior controlling staff, especially working-plans officers, and a larger establishment of trained subordinates, the effective application of the patrol system commended by the Forest Committee is impossible with the present limited protective staff; as observed in paragraph 66 of the Central Circle report, however, such patrols cannot altogether take the place of resident staff, the latter being necessary to supply sufficient local information. In so far as the contemplated reorganization improves the conditions and prospects of service, it should also go some way to raise the standard of conduct, which in the lower grades at present leaves much to be desired. Much consideration was devoted during the year under report to the elaboration of amendments to the Madras Forest Code designed to place District Forest Officers in a position of greater independence and responsibility than they have hitherto enjoyed. The Board's final proposals on this important matter have now been fully examined and the orders of Government will *shortly* issue.

ORAL EVIDENCE, 27TH JANUARY 1917.

President.—*Q*. You seem to think that a local research institute is very necessary?—*A*. I think the establishment of a properly equipped local research institute is very necessary. There might be a central research institute which might control the local ones. I think that any research work that the local institute might do should be known to the central institute so as to prevent overlapping. I think the Forest Department is capable of starting big schemes if they are properly investigated. The fault hitherto has been that investigations have been conducted in a very imperfect way and have not been suitable, as, for example, in connection with the suitable kind of wood for the match making industry. It may be that a few Forest officers have reported that a particular kind of wood has been suitable. Their word has been accepted without actual trial. We lose the confidence of the public thereby. I think we should go slowly and surely. We should find out what goods are suitable for the market and if necessary have demonstration factories. Unless the policy of the Madras Government changes very much there is little hope of the Forest Department being able to cope with future conditions. The present position of the department is almost desperate. I did not feel the position so much so long as I was a district officer. Since I became an administrative officer I have at times felt inclined to give up the matter as hopeless. There are too many brakes at the top. At present a Conservator of Forests has to go to the Board of Revenue where the head of his department is a layman. If he succeeds in convincing him of the necessity of his proposals, the Board then sends them up to the Government Secretariat which comprises three senior civilians who are also laymen. Assuming the proposals are passed by the secretariat they are then sent up to the Member of Council who is also a layman. Thus there are three powerful brakes through which schemes have to be successfully steered before they have any chance of success: and each brake is in charge of senior civilians, all of whom have been

Collectors and some of whom assume to know far more than they actually do in forest matters. The system is an impossible one and practically it has broken down. That is the way I look at it.

Q. Surely Government has to see that the present policy is carried out. Your proposals are departures from the recognised policy which the Government has been pursuing so far?—*A.* That is so perhaps, but a change is urgently called for.

Q. The question then will have to be investigated independently. You are therefore showing us in what way we can so man the Forest Department as to put these matters before Government in a different light?—*A.* I wish greatly to impress the fact that as long as the Forest Department is kept in such a hopeless and unorganized condition as at the present time, there can be no appreciable research progress.

Q. Government are only just now realising that research work must be done by specialists and on a larger scale so that it may be of commercial value?—*A.* That was impressed upon them many years ago. We could not make them believe it. That is the point.

Q. We have had the war since then?—*A.* That has changed the aspect of many affairs.

Q. And the war is being fought not by cavalry officers but by scientists?—*A.* Yes. The more we really work in the Forest Department the more scientists we shall need.

Hon'ble Pandit M. M. Malaviya.—*Q.* In summing up your conclusions you say "Last but by no means least there must be more intelligent sympathy with the real objects and aims of forest conservancy in this country on the part of the Government and a little less sympathy towards the ignorant susceptibilities of the peasant population." What is the aim of the forest policy that you have in view?—*A.* The improvement and preservation of the forest that we have got, in order to give our best to the present generation and at the same time to maintain our forests for future generations.

Q. For whose good?—*A.* For the good of the country in general.

Q. Is not the whole object that you have in view defeated when you begin by showing less sympathy with the present population than they deserve?—*A.* It is not a question of whether they deserve it or not.

Q. It is a question of their needs and wants?—*A.* I am not saying about their needs and wants. We will give them their needs and wants in a much cheaper way if we are allowed a freer hand.

Q. I do not know about the conditions prevailing in Madras. I know that in the United Provinces the lot of the people has been made very uncomfortable. If they want fuel for their domestic use, they have to go long distances to get it while they have forests before their very houses?—*A.* That is not so here. Hitherto the Government have considered the cry of the people more than they have cared for the scientific investigation of the real necessities of the people.

Mr. C. E. Low.—*Q.* Is not the situation this—that you would make the present generation suffer a little more inconvenience in order that the future generations may have more benefit?—*A.* That seems to be the situation which I would recommend.

Hon'ble Pandit M. M. Malaviya.—*A.* We will give them their requirements. But we say that they should be controlled. For instance if a forest can only support 1,000 cattle it is bad policy to allow 2,000 cattle to graze and thus spoil the forest. Many of the beasts are generally useless beasts. Many of the people are keeping more beasts than they have real need for. I think the Forest Department would be doing only its duty if it sees that 1,000 good cattle receive pasture rather than 2,000 useless beasts being allowed to waste the forests.

Q. Do you contemplate that fuel is likely to become dearer?—*A.* I would supply it as cheaply as possible and in many instances as a matter of fact the ryot near the forest seldom buys fuel. He picks it up himself.

Q. Then would you qualify your remarks by saying that you would do so without trespassing upon the legitimate rights of the people?—*A.* You seem to misunderstand my remarks. I do not in any way desire to detract sympathy from the people. Personally I have not had any difficulties in the areas in which I have served. Practically it is like the case of a doctor giving medicine to a child. Of course the child very often does not like the medicine. The same is the case with the ignorant ryot. He may not like restrictions. But undoubtedly they are necessary and in the long run beneficial to him and the people of this country.

Q. Would you apply the conditions in all cases?—*A.* I should like to have a concrete proposal made before I express an opinion. If you give me a definite concrete suggestion I shall be prepared to answer that question.

Sir F. H. Stewart.—*Q.* There was one suggestion that was put before us the other day. It was said that there is a good deal of waste land in certain districts of this presidency and that they should be taken up by the ordinary ryots for cultivation and that the Forest Department should make arrangements to have the forest cleared of the growth departmentally as the poor ryots cannot afford to pay for the forest growth on he land. Is this practicable?—*A*. You mean the value of the tree growth? I think hat would be a very simple matter. In many localities I advocate that the Forest Department should clear the tree growth before the land is given out for cultivation. have just come from an area where an attempt was made to do something similar. n this case the object was not so much to take up the cultivation of the land as to rade illicitly in forest produce which, I think, is a very dangerous proceeding. If a *onâ fide* cultivator comes along, the Forest Department would take steps to clear the and.

Q. Can that be done by the Forest Department alone?—*A*. Collectors can do it t present. The Collector in this particular instance argued that he had no power. think he was wrong. He obviously had the power. I know many Collectors have one it and the thing could be done if the man showed that he wanted the land for *onâ fide* cultivation and not for illicit trade in forest produce.

Q. To whom should such applications be made?—*A*. To the Collector in the first nstance. He generally refers such applications to the Forest officer for remarks.

WITNESS No. 232.

THE UNITED PLANTERS' ASSOCIATION OF SOUTHERN INDIA.

WRITTEN EVIDENCE SUBMITTED BY THE CHAIRMAN, MR. J. S. NICOLLS.

Financial aid.

We are of opinion that as a whole there is no need for direct Government aid for industries in this country but they should be fostered by indirect aid. The industries which require most attention are those which have agriculture as their direct basis and some such industries are already established strongly, e.g., cotton and jute. Indirect aid should take the form of improved railway communication and shipping facilities and of scientific aid in research.

Q. 1.—Difficulty in raising on temporary land tenure.

Difficulty in obtaining financial assistance from Indian banks on security of crops.

Suggestions.

Improved land tenure.

One Act safeguarding the interest of tenant as to improvement, e.g., Nilgiri-Wynad has no Act applicable.

Technical.

Q. 15.—The Scientific Department as concerned with the United Planters' Association of Southern India.

Q. 16.—Recognition of what scientific research has done for sugar, cotton and other industries.

Q. 17.—When asked for to be given as freely as possible.

Q. 18.—As far as our own industries are concerned we would have no objection to a full disclosure, but we recognise a difficulty that might occur in the matter of trade secrets being given away in the instance of Government experts obtaining and publishing any special methods or secrets of manufacture in other lines of merchandise.

Q. 22.—Kew has given valuable aid and information in many instances.

Q. 25.—Yes. Survey of land suitable for planting should be made and such knowledge should be easily obtainable by an intending investor.

Q. 26.—We recognise that the organisation could only be dealt with by Government servants with practical experience. The resources of the country should be obtainable from a Government department either in England or this country, at the present time it is impossible to obtain any correct information.

Assistance in marketing products.

Q. 34.—We believe that good would accrue from such appointment provided representatives were fully qualified and able to devote their whole time in furthering the development of the industries they represent.

Q. 35.—We can quite follow that instances might occur in which such appointment might become necessary.

Q. 38.—The system of purchasing cinchona and other commodities available in the country from European markets to the discouragement of the Indian producer.

Q. 39.—We are of opinion that this is beyond our sphere of knowledge.

Land policy.

Q. 41.—Yes. There is nothing to be said against Government title. But in planting districts the tenures are so various that it is next to impossible to tell the prospective investor how he will hold land. The intervention of the Indian landlord complicates matters. There are thousands of acres of land suitable for planting that might be and would be taken up were the titles not difficult to prove. The only suggestion we can offer is to sort out the titles so that any uncultivated land which is not the adjunct of a cultivated estate should pay land tax. Further we believe such a tax would go far to prove ownership. But we see the possibility of such a policy, being taken evil advantage of by enterprising men finding it profitable to pay a trifling acreage rent to establish a title to land useful for planting.

Titles of all holdings should be known to a Government department either in England or this country. At the present moment it is impossible in parts of India to obtain a sound title, be the investor as careful as he can be. After purchase he spends considerable amount of money and time in defending his title. Names and positions of boundaries, hilltops, and streams are juggled in the most marvellous way.

Official organisation.

We are in favour of a Director of Industry working with an Advisory Board, but he should be a provincial officer for it is certain that many of the questions that crop up can only be dealt with sympathetically by a man with local knowledge. The Director should work in close touch with the Director of Agriculture and should deal with all agricultural matters except the improvement of agricultural methods which would be the duty of his colleague the Director of Agriculture.

Q. 58.—In regard to the Advisory Board, from our point of view it should have representatives of Native States on it. We are politically one body and we cannot dissociate ourselves from our brothers in the Native States. Geographically the planting industry of South India is one and our interests in development are identical.

Technical and scientific departments.

As far as Agriculture is generally concerned we have the Agricultural College and Research Institute, but this is woefully undermanned and the expenditure thereon is but a fraction of what might be spent profitably. Our own position as planters is that we are far behind our neighbours in Ceylon, Java and the Straits in the matter of advisers.

Qs. 63 *to* 81.—Our views have already been fully put before the Government, regarding the development of our Scientific Department.

Certificates of quality, etc.

Q. 89.—We are of opinion that Government should insist upon a certificate on all imported food stuffs into India from outside and sold at a lower rate than it costs to produce a sound article in India.

Q. 90.—A system similar to that ruling in the United States of America on imported food stuffs.

Q. 91.—Although in most instances adulteration probably happens after products have left the producers' possession and been landed in those of the retailers in foreign markets, we are of opinion that adulteration of coffee and tea does take place in India itself and we think that severe penalties should be imposed on detection.

Registration of partnerships.

Q. 96.—We are of opinion that it has become an absolute necessity and more than desirable to protect the Empire against the introduction of alien monopolies working to the detriment of the Empire and its Colonies.

Roads, railways and waterways.

Qs. 97 *to* 101.—Our views on this subject have been completely and fully put before Government and we would emphasise the necessity of a harbour on the west coast capable of shipping in all months of the year at the termination of one of the railway projects put forward.

Hydro-electric power surveys.

Q. 102.—Inquiries have been made on one or two schemes but no practical results have followed, but we believe that there are great possibilities in the Madras Presidency of development in this line.

Saq.—Mysore Government Messrs. James Finlay & Company, projects we think further investigation should be made.

General.

Q. 110.—Covered by our answers—which are purely in the interests of the agricultural development of the country—

Scientific,
Facilities of transport and shipping,
Land tenure,
Medical aid.

NOTE.—We are of opinion that Government might benefit the employers of labourers, and the health of the present generation and of those to come, by allowing purchase of medical stores on easy terms—e.g., the system now in vogue in Ceylon to employers of labourers on coffee, tea, rubber and other estates—and by developing grant-in-aid hospitals or dispensaries.

ORAL EVIDENCE, 27TH JANUARY 1917.

THE UNITED PLANTERS' ASSOCIATION OF SOUTHERN INDIA
was represented by

(1) MR. J. S. NICOLLS *of Devarshola Estate and Chairman, United Planters' Association of Southern India.*

(2) HON'BLE MR. E. F. BARBER *of the firm of Barber and Pascoe, Estate Agents, Nilgiris*

President.—*Q.* You say in answer to question 38 that the system of purchasing cinchona and other commodities available in the country from European markets has led to the discouragement of the Indian producer?—*A.* Any answer to that question is rather shutting the stable door after the horses have been stolen. We had a lot of cinchona in the country and it is quite possible to keep up and encourage that industry by purchasing from the planters at reasonable rates rather than buy in the foreign countries.

Q. But the Government have established their own cinchona plantations?—*A.* They have been buying from outside too.

Q. They need not have done either of these. They need not have their own plantations and paid for it from outside?—*A.* That is what I think.

Q. To discuss that kind of thing one would have to know the quantity required and whether the quantity was forthcoming locally. Your conclusion then is that the plantations are not necessary?—*A.* The Government plantations are not necessary.

Q. Is that for the whole of India?—*A.* For the requirements of the Madras Quinine Factory.

Q. Is there a private cinchona plantation in the north of India? There is also a big Government plantation?—*A.* Yes.

Q. They are extending that work now with reference to other drugs. You do not know whether there is a private growth of drug producing plants?—*A.* I cannot think of any.

Q. Is cinchona a fairly big item in the planting industry in the south of India?—*A.* It was very large at one time. I could not give you the number of acres. Up to ten years ago there was a considerable lot.

Q. What do you think would be the cost of removal of the cinchona from the scattered plantations instead of having a concentrated area of cinchona growth under Government?—*A.* I cannot think that the cost of getting it from anywhere in southern India greater or more expensive than bringing it from Amsterdam in the form of bark.

Q. That is not in the manufactured form?—*A.* That is only in barks.

Q. We do not try to defend the system of purchase from foreign countries if the industries here develop. Do you think that it would be more economical if the areas are concentrated?—*A.* That would be more economical But you have to face the risk of disease.

Q. Could you give some idea as to how private cinchona plantations are distributed?—*A.* There is one right down at Pearmede, through the Wynad and in the Anamalais and in the Nilgiris.

Q. Is that exising or diminishing?—*A.* In the Nilgiris the acreage is now very small and in the Wynad it is defunct.

Q. Through the Government competition and the importation of foreign cinchona?—*A.* Because the market price went so low.

Q It was only proper that the market price should be so low seeing that the medicine is intended for use by the common people?—*A.* It is unfair to sell an article below the cost of production.

Q. Government evidently did it as a charitable measure, as a prophylactic against disease?—*A.* The cost of production has also to be reckoned and we could produce much cheaper than Government.

Mr. C. E. Low.—*Q.* Have you got much difficulty about titles in Native States?—*A.* We have had a certain amount particularly in Native States.

Q. Are the Native States much more difficult as regards titles?—*A.* It is more difficult to put them right.

Q. Some of this trouble was due to lack of proper survey?—*A.* I think entirely.

Sir F. H. Stewart.—*Q.* In answer to Q. 97 to 101 you say that your views on the subject of railways and waterways have been fully placed before Government. Is that in a concrete form?—*A.* Yes in a concrete form.

Q. Could you give us a copy of the note?—*A.* It is in the form of correspondence, not in the shape of one letter. It is specific in regard to the construction required.

Q. Could you send that correspondence to the Secretary?—*A.* Yes, we could send it to you.*

Q. You say that you would emphasise the necessity of a harbour on the west coast capable of shipping in all months of the year. Have you got any particular port in view?—*A.* Cochin is a very important place as regards tea and rubber.

President.—*Q.* Is there trouble about the export duty?—*A.* That has been put right. I do not think it would affect Cochin.

Hon'ble Sir R. N. Mookerjee.—*Q.* Are there any Indian members in your Association?—*A.* There used to be Indian members. They have dropped out.

Q. You recommend that there is no need for direct financial assistance to industries and you think that indirect assistance might take the form of improved railway communication, and shipping facilities and so forth. Do you think that these indirect aids would be sufficient to induce Indian investors to bring in their money and start new industries?—*A.* I could not speak about Indian investors. I am only speaking about European investors.

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* Not printed.

Q. All that you say in [illegible] not speak about Indian [illegible].

Q. My point is whether [illegible] would be [illegible] for Indians to start industries. We have been told that Indian [illegible] in new enterprises and with Government aid, Indians could [illegible] an industrial life?—*A.* Certainly I think [illegible] it will be a step in the [illegible]. There is a certain number of Indians engaged in industry, such as [illegible] and coffee. I think they would all benefit.

Q. You say in regard to the Advisory Board, "from our point of [illegible] have representatives in the Native States." Do you think that the Director [illegible] will have control over the industries in the Native States?—*A.* I think [illegible] ought to be arranged somehow. I do not know how it can be done. At present [illegible] Government of Madras have started a scientific department for the United Planters' Association and that department works in the Native States. The scientific scheme now before Government contemplates experimental stations in Native States such as Travancore Mysore and Cochin.

Q. With reference to banking difficulties have you got any special case where a bank refused to lend money on crops?—*A.* There is a complaint to that effect from Mysore. I am afraid I have not got anything to support that statement. Personally I have found no difficulty in getting finance on crops.

Q. In regard to the Agricultural Department do you mean to say that you have asked for some information from Pusa and did not get it?—*A.* As a rule if there is any difficulty about getting information we send over the thing to Ceylon and we object to sending the thing to a Crown Colony. I think the Imperial Government ought to be able to furnish it.

Q. Did you apply to Pusa?—*A.* We have had no occasion to apply. We have applied in the matter of assistance through the local Research Institute at Coimbatore.

Q. You think that there should be a general survey of hydro-electric schemes in these provinces Do you think it would be conducive to the development of new industries?—*A.* I think there is very great scope. A general survey of the country would be of great use. At present there is any amount of water running to waste and you want the industry near it before you can make use of it.

Mr. A. Chatterton.—*Q.* What are the relations between the Department of Agriculture and the Planters' Association? Have you a special Deputy Director of Agriculture to look after your work?—*A.* Yes. He has only recently been appointed.

Q. How much does the Association contribute towards the expense?—*A.* At present we contribute three thousand rupees under the present scheme and we have offered to contribute ten thousand rupees under the proposed scheme.

Q. What is the difference between the proposed scheme and the present scheme?—*A.* At present there is one man and he gives advice and tours about. He is an agricultural chemist. We want a mycologist and some experimental stations.

Q. Has your Association any similar arrangement with the Mysore Agricultural Department?—*A.* I think not. The Mysore Government contribute a certain amount towards our scientific department and of course they work in very closely. The Director of Agriculture and Dr. Coleman are working together.

Q. Do you know the extent to which Indians are investing in the planting industries in Mysore? Will two-thirds of the planting area be in the hands of Indians?—*A.* I believe it is very heavy. I could not give you the acreage.

Q. Will it be about two-thirds?—*A.* Yes.

Q. And to the same extent in Coorg?—*A.* Not to the same extent in Coorg. I am not certain.

Q. Does not the Indian planter work on very much the same scale as an ordinary ryot?—*A.* There are some fairly big estates.

Q. Are those the estates which have been acquired by certain wealthy firms?—*A.* Yes. But I hear that it is on a considerably smaller scale than the European.

Q. Do tea planters more especially use water-power much?—*A.* Yes. Water-power is used wherever possible. But very often you cannot get a good factory with water-power and then preference is given to suction gas engines.

Q. There are in the hills a very large number of suction gas pumps, oil engines, etc. Are the planters ever in difficulties regarding them?—*A.* I have never experienced any difficulty.

Mr. C. E. Low.—*Q.* Has the question of turning rubber to industrial uses in this country been ever tackled by any of the members of your Association in view of its great importance from the point of view of this country?—*A.* We have not taken up the matter. I have heard it discussed.

Q. Discussed with what object?—*A.* Wondering whether it was possible or not. Ceylon lately started the same idea. I fancy it was turned down on the score of climate. I do not think it has been discussed seriously.

[illegible]
[illegible] on the subject [illegible] nothing.
[illegible] never got to the point in which you [illegible]?—A. No. The Rubber Association have published pamphlets.

Mr. President.—*Q.* Has the climate been [illegible] to be unsuitable?—*A.* Messrs. Dunlop [illegible] tried. I believe they could not vulcanise.

Q. Did they actually work up the thing?—*A.* They worked it up in a scientific way.

[illegible] question of moisture or temperature?—*A.* I could not tell you.

Mr. [illegible] Low.—*Q.* Do you know how much rubber is produced?—*A.* About a [illegible]00 [illegible] is exported. It is getting up rapidly.

Q. Do you think there is enough to get a factory in full working order for a variety of things?—*A.* I have got no detailed information on the point. I know the quantity is increasing rapidly and ought to feed a factory.

Q. Have you any supplementary points to bring forward?—*A.* I should like to say a few words in connection with the scientific department but Mr. Innes has already dealt on the matter from our point of view

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WITNESS NO. 233.

Mr. Vidya Sagar Pandya, *Secretary, the Indian Bank (Limited), Madras.*

WRITTEN EVIDENCE.

Preliminary Remarks.

The Hon'ble Sir William Clark, in the course of his speech in the Imperial Council, accepting on behalf of the Government the resolution of the Hon'ble Sir Ibrahim Rahimtoola for the appointment of this Indian Industrial Commission " to consider and report on what measures should be adopted for the growth and development of industries in India," observed that " the building up of industries where the capital, control and management should be in the hands of Indians was the special object which we have all in view.". So we have to find ways and means which " would in effect secure the above object " of fostering industries in India by Indians and not by exploitation of any industries in India by any aliens. Sir William Clark rightly emphasised that " it is of immense importance alike to India herself and to the Empire as a whole that Indians should take a larger share in the industrial development of their country. Such progress means a higher standard of living, greater prosperity and not least, greater scope for political development." He wished that Indians should seize the present opportunities. What was the use of taking any step, he asked the Council, if it " merely meant that the manufacturer who now competes with you from a distance, would transfer his activities to India and compete with you within your own boundaries?" I wish to make it clear, that in making the above remarks, I have no feeling of hostility to British enterprise in India if they allow a proper control by, and a fair share of the profits to, Indians, to which they are entitled, by associating them on an equal footing in the different concerns in the country. I believe that British capital and British skill will be materially helpful in the economic development of India and in bringing adequate profits to the British for their co-operation. Provided hereafter the British associate Indians in all departments of work as fellow partners and factories are established and worked in India, I would welcome British enterprise. Any other arrangement under which Indians cannot share the full benefits of the development and growth of industries can only be called " exploitation of industries in India " for the benefit of certain interests and the laudable object which the Government of India has placed before itself to encourage indigenous enterprise, industries and finance will not be attained.

Capital.

Q. 1. The first difficulty in raising capital is, generally speaking, the public have no confidence in the technical and business knowledge and experience of Indians who promote enterprises, and so capital does not come in in abundance.

To enable Indians to inspire public confidence, it is of paramount importance that they should be associated actively with Europeans in industrial, commercial and financial enterprises.

It should be made quite clear to all concerned that no financial help or concession of any sort will be given by the Government to any business in India unless half the number of Directors, on the Board of Control of such establishment in India, are Indians and all things being equal, Indians are given preference in all departments of working. Further in order to secure facilities to Indians for apprenticing themselves abroad to gain knowledge and experience of business, it should be insisted on in placing orders of the Government of India for purchases abroad that the manufacturing concerns should give all reasonable facilities to Indians for apprenticeship under proper conditions. This will partly relieve the necessity of importing experts wholesale. It is better that Indians are trained at home and abroad when there are opportunities of securing apprenticeship instead of getting experts from abroad. It is hardly necessary for me to instance the case of Bombay where there has been closer co-operation between British and Indian business men with the result that Indians have undertaken great enterprises and Indian capital flows to some of these concerns from all parts of the country. Thus all British and foreign concerns, especially those which seek Government help of any sort, must be asked to allot a definite proportion of capital to Indians to secure an adequate Indian element on the Board and management Or some system of cumulative voting may be introduced to secure Indian representation. Thus only can Indians gain their share of profits and experience which is now altogether lost. Thus the best men will be drawn to industrial pursuits. Indians have a great weakness for Government-supported institutions and full advantage should be taken of this fact. What Indians want to be assured of in the first instance is that success will be attained. They fear that for want of technical and expert mastery of the details of the business, it may not prove a success. They desire to be assured on these points by an independent authority other than the promoters, when the names of the promoters do not inspire confidence.

Secondly, Indians expect quick and good return for their investment. To remove this difficulty, interest may be guaranteed by Government in the case of those industries the working of which will conduce to the benefit of the whole Indian populataion or the defence of the country.

In the third place, there are no financial or banking organisations to mobilise what money may be available in the country or to advise the Indian public in the choice of their investments. Further, there is no organisation, as in other countries, to facilitate the purchase, sale or negotiation of the securities. There are no brokers or stock exchanges in this Presidency. There are no under-writing houses or institutions to lend freely on the shares. Thus industrial investment at present means only locking up of money. When 90 per cent of the Indian public are uneducated, they cannot understand the value of industrial development or possibilities or judge the soundness of any enterprise. The absence of instinct for combination and co-operation, and mutual distrust stand in the way. Adverse, unjust and dispiriting criticisms levelled by the Anglo-Indian Press for removing the rivals in the field make matters worse.

Regarding the general education of the masses—primary and secondary education—so much has been said elsewhere that it is unnecessary for me to dilate on the subject. But I would suggest that to really impress the dignity of hand labour on the population, the introduction of educational handiwork as a compulsory subject in all schools is necessary. The school curriculum requires to be modified. It is exclusively literary. Business, financial and economic subjects may be included in the school study. School readers should be prescribed in which the lives and exploits of entrepreneurs, captains of industry, financiers and scientists who have contributed to industrial inventions are given. More attention should be paid to teaching the practical uses of economic products, etc. Small penny banks may be attached to certain schools as in certain counties in England, so that practical thrift may be inculcated.

Fourthly, the best educated brains of the country have not yet taken to industries, but are attracted to Government service, Law, etc. If they are given proper training facilities for gaining business experience and profitable employment for their activities, an intelligent educated class will take to business more and more and confidence in the industrial concerns will be strengthened and there will then be no lack of Indian capital.

So far the Government has not done as much as it should have for the economic development of the country by the Indians.

Q. 2. So far as I am aware, capital for industrial and other enterprises is generally drawn from the savings of Government servants, professional men and rich landlords.

To get an accurate idea, the Commission may ask the various Registrars of Join Stock Companies in the several Provinces to look up the industrial concerns and tabulat the different shareholders under suitable classes by profession, residence, etc., as th lists of shareholders which the Joint Stock Companies are required to submit alread contain the information. Such a compilation will give more accurate information o the point than general impressions of individual witnesses. It will go further to sho how funds go from one Province to another to seek investment.

Government assistance.

Q. 5. Money grants-in-aid may be given freely for improvement of methods an tools and to encourage inventions, patents and designs in India.

The question of bounties and subsidies is very closely connected with questions o protection and tariffs and fiscal autonomy which are excluded from the scope of thi Commission. In my opinion money grants-in-aid, bounties, subsidies and guarantee dividends, loans with or without interest, supply of machinery, provision of shar capital and such other aids as may be required may be given in cases where there is chance of creating an industrial monopoly for India similar to the manufacture o opium or jute or of primary industries such as Railways, Shipping, etc., when suc industry may, if necessary, be acquired by Government at any time to be worked o behalf of the nation.

Government should invariably guarantee purchase of products of local manufacture. Preference should always be given to local manufactures over exported articles even at a little sacrifice.

Q. 6. There should be inspection and audit in almost all cases of Government help except under (7), and there should be strict supervision and official control under (2) and (6) and supervision without active interference in the working in cases of (3), (4) and (5).

Ordinarily Government may reserve powers to nominate additional directors who should ordinarily be chosen out of the shareholders, preferably non-official Indians, who hold sufficient number of qualifying shares. The Government Directors should submit reports.

Financing agencies.

Enterprises—industrial or commercial—under Anglo-Indian control and management in this Presidency do not find any difficulty in securing financial help from the Presidency Bank, and Exchange Banks. The customer and banker being intimately known to each other, perfect mutual confidence is established both in India and in England. One depends on and is supported by the other, as their interests are identical. Further, the retired and working partners in England are able to exercise considerable influence in several ways, such as, securing financial help both in opening credits from outside and getting capital subscribed from abroad and arranging liberal facilities by the Exchange Banks through the London offices. The Exchange Banks get deposits from the Secretary of State for India out of Indian balances. (It seems to me that there is no reason why they or other banks in London should have deposits of Indian money at cheap rates of interest while the same if diverted to India would be of immense benefit to her. Indeed I do not see the justice or the necessity for the Government to finance trade through the banks anywhere in England.) They further enjoy very liberal discount facilities from big London banks. Having large deposits they are amply supplied with resources and working capital proportionate to the increased credit requirements of the Anglo-Indian community. The Exchange Banks in this Presidency keep mostly to the business of financing exports and imports and practically do very little or hardly any local business for Indians.

I have no desire to repeat how the Bank of Madras also has been a source of help to the Exchange Banks and the Anglo-Indian community. I would request the attention of the Commission to the series of letters I wrote recently in reply to the President of the bank. It is the Anglo-Indian community principally that gets the benefit of this bank as its Directors have been exclusively the leading Anglo-Indian merchants and lawyers. An almost identical body controls and guides the Madras Chamber of Commerce and the Bank of Madras. And so the Anglo-Indian community has in fact ample funds to undertake various enterprises.

There are three kinds of banking institutions:—

(1) *The Exchange Banks.*—I have explained above that they confine themselves mostly to export and import business and do very little purely local business for Indians.

(2) *The Presidency Banks.*—The Bank of Madras. To know what help and treatment it has given to the Indian community of this Presidency, how they have financed crops and what systematic scheme and sympathetic desire they have to finance Indian trade and industries are already narrated by me in my memorandum (paragraphs 24 to 44) submitted before the Royal Commission on Indian Finance and Currency and in my recent five letters (referred to above) to the press. These * I append and may be taken as part of this my evidence.

3. Leaving the above two kinds of strong banks, there are a few very small joint stock banking institutions under purely Indian control under inexperienced Directors and Managers. They are too small to render any appreciable help to Indian industries or local trade. With very poor resources, they are slavishly modelled for short commercial credits and it is not possible for them to render the help which is required for the full industrial and commercial development of this large Presidency.

Q. 10. *The Presidency Banks.*—(*a*) Assuming Government funds will continue to be used to finance trade they should be made to take Indians on their Board of Directors and on the staff of the superior executive offices both at the head office and branches in order that mutual confidence may be established through such Indian Directors between the bank and Indian customers.

(*b*) The Presidency Banks Act was passed in 1876 and subsequently small alterations were made from time to time. The whole Act requires to be recast so that—

(1) shareholders may have the same rights as those of the Joint Stock Companies and be given an effective control in the policy of the bank;

(2) shares may be held more largely in India and by Indians;

(3) powers to grant loans on certain securities may be revised and widened.

(*c*) They may be required to give undivided attention to the internal trade.

(*d*) They may be required to open out numerous branches throughout the country.

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* Not printed.

Existing Indian joint stock banking institutions.—Existing institutions controlled and managed by Indians should be encouraged by lending or keeping Government funds with them under proper safeguards. Such encouragement will lead to the improvement of the existing banks and the foundation of new institutions suited to the requirements of the country.

New banking agencies.—When such advanced countries as England, France and America with an already highly developed machinery of credit, are seriously thinking of formulating some scheme or other which will meet their own new requirements, how much more is it necessary that the Indian industrialists, commercial magnates and the Indian Government should exert themselves to provide ample banking facilities and thorough organisation of credit for this country? Owing to the destruction of wealth by the war, India will be thrown largely upon her own resources in the future. To be successful in the coming trade and industrial struggle and for other monetary requirements of the Government, India should be equipped with the best monetary and credit systems and organisation, etc.

The Indian Industrial Commission is now engaged in the investigation of the possibilities of industries and in finding out the sort of financial help that is necessary for our industrial development in the different parts of the country. Banking institutions are intended for the help of industries and any scheme for their financial help can be drawn up only after the requirements are fully known. After these requirements are known, it will be best if the Government, following the suggestion of the Royal Commission on Indian Finance and Currency, appoint a representative "Banking Commission" to go thoroughly into the matter of banking, i.e., State or Central Bank, Presidency Banks, and other banking and financial institutions, in the light of the requirements of the Indian industries, agriculture and commerce. They may formulate a proper scheme on which banking legislation may be undertaken as the Government have been for some time past contemplating such a step. I may be permitted to suggest that the Banking Commission after studying the local requirements should go out to important countries and study how other nations have provided for similar ends and also examine the important banking system of other countries, as the American Monetary Commission of 1908 did, and then in the light of experience and knowledge so gained they should submit a report on a banking scheme for Indian local requirements from the Indian national point of view.

As this Commission is anxious to avoid overlapping of work this visit to foreign countries is very necessary as Lord Faringdon's Committee have already reported and I understand there are some other schemes of industrial and mercantile banks in London with regional banks for trade and industries and international credit and discount institutions, etc. It is necessary that the Banking Commission should fully benefit by examining all the systems in their actual working on the spot. Such an inquiry is surely necessary in the interests of India and should be undertaken as early as possible.

In order to help industries and commerce it is necessary to mobilise the funds available in the country and to do so it will be necessary to examine and introduce institutions for the encouragement of thrift in the country of the kind that are now being worked successfully in other countries, such as Savings Banks, Penny Banks, Land Banks, etc.

It will also be necessary for the Commission suggested by me above to study and go fully into the instruments of evidence of indebtedness in connection with loans and discount, i.e., the system of bills of exchange and acceptances, bonds, stocks, debentures, etc., which make a fundamental difference between the European and American banking and to carefully consider their bearing on the question of organising credit in this country.

Technical aid.

Qs. 15-27. A number of valuable suggestions have been made by several witnesses more competent to speak on the matter than myself.

For technological and scientific education, Government should take a bold step. I think that even a few crores of rupees for imparting technological and scientific education should not be grudged in view of the vast importance of such institutions in the present low economic condition of this great country. It seems to me that Mr. Gokhale's suggestion is worth considering, that the Government should increase its unproductive debt by about 10 crores of rupees in spreading technical and scientific education and in establishing first rate science libraries throughout the country. Twenty libraries at 3 lakhs of rupees each, half a dozen first grade colleges with technical (or applied science) side at 20 lakhs of rupees each, a dozen or two second grade institutions at 5 lakhs of rupees each may be established and elementary schools of a technical nature scattered all over the country. This may entail a recurring expenditure of say a crore of rupees.

Official organisation.

Qs. 57-59. There should be a Board of Industries consisting of officials and non-officials the latter being always in the majority, with the Director of Industries as an ex-officio member and also as the Secretary to the Board.

The functions of the Board should be to—

(*a*) organise commercial museums,

(*b*) establish industrial exhibitions and shows,

(c) establish libraries,
(d) publish literature and
(e) examine and recommend parties for Government aid and expert advice, etc.

It should be an advisory body and should have executive powers also with budgetted funds, so that it may demonstrate industrial and commercial possibilities of certain industries and carry out the other functions indicated above.

Q. 60. There should be a Director of Industries.

He should be a non-expert official as he will have experts to assist him and the business experience will be supplied by the members of the Advisory Board.

Preferably, as regards his other qualifications he should be an Indian of experience.

Q. 61. The Director of Industries acting as the Secretary of the Board would be the connecting link between the Board and the Provincial Government. He will be the executive officer to investigate and place the results for discussion by and approval of the Board.

Q. 62. There should be a central Technological and Research Institute with a regular staff of experts working under a Director. The Director should be able to advise the local Provincial Boards on such matters in which his advice may be sought. The various Provincial Directors of Industries will keep the Central Director informed of their local activities.

Study of foreign methods.

Q. 77. Members of the Indian Medical Service are given special study leave and allowance to enable them to go to England to study and acquire up-to-date practical knowledge in their profession. Similar facilities may be given to Government servants in all departments not only for going to England but other countries, East and West. For a certain number of non-official deserving Indians (selected every year by the Board of Industries) special monetary help should be given and for any Indian who wants to go at his own expense Government should arrange all facilities such as introductions to enable him to study for the special branch he takes up. The British Consuls should render them help for admissions and introductions into recognised scientific bodies, libraries, museums and laboratories and for visiting workshops and factories and render all reasonable help to attain their object. As much encouragement as is possible for the Government to give must be given to Indians in all walks of life to enable them to visit foreign countries to study the conditions and methods prevailing there.

Reference libraries.

Q. 78. Practically there is not a single library of technical, scientific and economic works in this Presidency.

Q. 79. I would strongly urge the establishment of first rate scientific and economic libraries throughout the country. I would suggest say 20 libraries at 3 to 5 lakhs of rupees each in the country.

College of commerce.

Q. 80. The establishment of a college of commerce is necessary in my Province.

It should be organised in the first instance on the same model as the Sydenham College of Commerce, Bombay, to take up (1) commercial education and gradually to be extended on the lines of the colleges in America and Germany to include (2) agriculture and connected industries and (3) technology.

Q. 81. A college of commerce affiliated to the University and worked on proper lines will meet the demand for men trained in the science and practice of commerce and by affording facilities, further demands, as well as means of meeting such demands will be created.

It may not guarantee to turn out full fledged business men any more than any other faculties can guarantee full grown lawyers, engineers, doctors, etc. It can however attempt to give training and adaptability so that a man who has undergone training can adapt himself to a business life very much quicker and with greater ease than an ordinary man. He can find his way with much less confusion on account of his wider knowledge and perspective and the ability of forming sound judgment which he would acquire in the college.

Industrial development will certainly gain by the accession to the management, sales and audit of a business concern of trained men with liberal education and expert knowledge, breadth of out-look, organising capacity and force of character.

By drawing such men into industrial pursuits more confidence will be restored in the business success of such enterprises and some of the talent will be drafted to industrial developments which now go away either to Government service or Law, etc., and cause overcrowding in those professions.

Commercial intelligence.

Qs. 82-88. Some of the important statistics should be published in some of the principal vernaculars of the different Provinces.

Statistics must be collected and issued as early as possible. In certain instances they are long delayed though generally they are now published much quicker than formerly.

Government publications must be more liberally supplied to public bodies. A larger and more liberal list of public bodies should be drawn up. All public institutions which are prepared to allow free access to their libraries may be supplied with Government statistical publications free of charge.

Government may not establish any English or Vernacular Industrial or Trade journals, but should freely assist private enterprises in starting such English and Vernacular Industrial and Trade journals in the country. They may see that such journals do not degenerate into advertisements or media for the sale of any manufactures or goods of particular communities or countries. They should be of real use to persons actually engaged in Indian trade, and Indian interests.

All foreign companies, as defined in the Indian Companies Act, should be required to file, besides the companies' general balance-sheet, a special balance-sheet showing the assets and liabilities of the Indian business and also its profit and loss account.

Registration of partnerships.

Those who enter into any engagements can easily satisfy themselves as to who are the partners. I have not found any practical difficulty to justify the introduction of registration of partnership. People are generally willing to disclose who are the partners. If there is any partnership deed they are willing to produce it for inspection and registration.

However, a system of registration or disclosure of partnership by alien firms trading in India may be introduced.

ORAL EVIDENCE, 29TH JANUARY 1917.

Sir F. H. Stewart.—*Q.* You are Secretary of the Indian Bank, Madras?—*A.* Yes.

Q. How long has that bank been in existence?—*A.* Nearly ten years.

Q. Have you been Secretary throughout?—*A.* Yes.

Q. What is its capital?—*A.* Our subscribed capital is 20 lakhs.

Q. Paid up?—*A.* 10 lakhs.

Q. Have you got branches in different parts of the presidency?—*A.* Yes, two in out-stations, Madura and Cocanada, and two in the town.

Q. What dividends have you been paying?—*A.* For the first year or year and a half we paid 4 per cent then for one year 5 per cent, then 5½ per cent and then for four or five years 6 per cent. Last year we paid 7½ per cent.

Q. Where did you get your training as a banker?—*A.* In the beginning, in 1903, I joined the late People's Bank as an accountant in Karachi.

Q. To begin with, where did you get your banking education?—*A.* First I was an Auditor for nearly five years in connection with banks. That was the first stage. Then I took up service in banks, and so on.

Q. Is there any institution in India that gives banking education as such, I mean which specialises in banking education?—*A.* There is no regular training institution but some banks do take some apprentices to give them an idea of their system of working.

Q. Do you do that at all?—*A.* We do.

Q. Your bank is entirely an Indian enterprise?—*A.* Entirely. Of course we have got a few European shareholders.

Q. Do you think it would be a good thing if there were an Institute of Bankers in India that could hold examinations and grant certificates?—*A.* It would be all right if banks further developed in the country. I don't think they will find sufficient candidates to sit for those examinations with the small number of banks at present.

Q. They would hold examinations more or less on the same lines that the Institute of Bankers at home does?—*A.* Yes, but those certificates have not much value so far as those candidates who pass examinations are concerned. It does not give them the right to any appointment or preference for appointment.

Q. It is a good backing for a man if he can say he holds a certificate from such and such an institute?—*A.* Certainly in the case of accountants they pass the London examination, but the important offices do not put much value on it.

Q. You refer to the unwillingness of Indians to embark on industrial enterprises. There are two main reasons I suppose, one is partly want of confidence due to past failure, and the other to the fact that they can employ their capital more remuneratively in land or house property, etc. Would you say that that is so?—*A.* I don't think that that stands much in the way. I say it is more want of confidence.

Q. You think that if confidence could be established that Indian capital would be forthcoming in greater quantities than hitherto?—*A.* Yes.

Q. Then you say that it would inspire confidence if there was a good deal of Indian control, one-half of the directors being Indians?—*A.* Yes.

Q. Do you think that would bring out Indian capital as things go?—*A.* It would tend to bring out capital to a larger extent.

Q. Take the case of a very flourishing company that was put before us. It had two Indian directors out of five, yet there is no great deal of Indian capital in that company?—*A.* That was established long ago.

Q. You think that today the position is different?—*A.* Of course it is changing. Indian capitalists are distinctly more ready to come forward than they were a few years ago. Further I might tell you, as regards Madras most of the investments are practically fixed investments. They do not change hands as they do in Bombay and Calcutta. There is no stock exchange. From my own experience I don't think, during our ten years existence, there have been more than 100 changes in our shareholders' register.

Q. Then you say that Government when it gives financial help "may reserve powers to nominate additional directors who should ordinarily be chosen out of the shareholders, preferably non-official Indians, who hold sufficient number of qualifying shares." You do not make a man a director necessarily if he holds the bare number of qualifying shares?—*A.* Certainly not.

Q. You mean a sufficient number of shares—proportionate to the capital of the company?—*A.* I mean qualifying shares for director, as prescribed by their articles.

Q. Then you refer to the exchange banks. Would you agree that the exchange banks hardly regard it as their functions to promote industrial enterprise?—*A.* They don't profess to do it. They cater for commerce and strictly confine themselves to it. To some extent they undertake local business, but that is a very little part.

Q. Then in regard to questions of banking generally and banking facilities you are anxious to have a Banking Commission?—*A.* Yes. My suggestion is to go into the whole system and see what facilities we require, not only the question of State Banks but the mobilisation of funds for the country.

Q. You think that Government might put some of its balances into Indian banks?—*A.* Yes.

Q. Do you think that that might also be a source of embarrassment to the banks at some time? They have not got very large capital. Government balances fluctuate continuously; would you be able to make sure of being able to use that money?—*A.* Yes. Look into the balances of the Government of India both in India and in England. They have been very large, and they could easily spare part of the money in India which they have been investing mostly in those banks in London.

Q. Do you lend money on landed property and bricks and mortar?—*A.* No, we generally avoid that. We sometimes lend on what we call equitable mortgage. During the busy season we take that as collateral security. But that is very small.

Q. Would you say that Indian banks generally are sufficiently developed now, *i.e.*, are on a sufficiently stable basis to make it safe to entrust them with Government funds?—*A.* All of them may not be, but those able to give security should be given.

Q. It is public money, and if it were lost, the public would have to replace it?—*A.* Certainly. The money might be given under certain safeguards.

Q. Do you think that banking legislation is necessary to preclude the formation of mushroom banks?—*A.* Legislation won't improve the general conditions of the country. Of course if we take steps to organise banking institutions in the country and Government help, we might expect some improvement, but mere legislation won't help much.

Q. As regards the Director of Industries, you think that he should, for choice, be a non-expert official and an Indian? I should like to put before you suggestions that were made to us the other day about the qualifications of such a Director. He should serve an apprenticeship in a works in Great Britain, spend two or three years in a University and take a degree in engineering or science, obtain ten years practical experience in an industrial company in India, should have a knowledge of the language of the province, and be a man full of ideas. Do you think that in the present state of affairs in this country you could find an Indian who could fill the position of Director of Industries?—*A.* Possessing those qualifications? I don't know that I could point out to anybody in this country, not even a European.

Q. You think that the Director should be assisted by a Board which should be advisory and which should also have executive powers. In whose hands would you place the executive powers?—In those of the Board?—*A.* Yes.

Q. Then it would not be advisory, it would be executive?—*A.* They would be both, advise the Government in certain matters and carry out the things they have laid out for their own work.

Q. Your proposal is that the Director of Industries should really be the mouthpiece of the Board?—*A.* Yes.

Q. Not that he should be independent of them and have them to help and advice him?—*A.* No, as an officer he should take the initiative and place matters before the Board, but he should abide by the decisions of the Board.

Q. What should be the relations of the Board towards the Local Government; under whose control? Under the Financial Department of the Local Government?—*A.* I have not thought over it.

Q. You speak about giving Government servants and non-official Indians facilities to go to England for study, and you instance the case of the Indian Medical Service. There you are dealing with members of a very highly trained and qualified service where Government might be certain to get value for their money, but you would not assist any one who wanted to go to do so?—*A.* I leave that to the Advisory Board to decide. In the case of the Medical Service I was told that they are expected to go once in every six or seven years.

Q. With reference to your remarks about registration of partnership, speaking to you as a banker, would you not be more ready to lend money to a firm where you are quite sure of the partnership?—*A.* That we make sure of before we advance money.

Q. How can you make sure?—*A.* We ask the party to produce the partnership deed if there is any.

Q. If they have not got any?—*A.* We ask them to give us letters signed by all the partners to the effect that they are partners, and that they will bind themselves severally and jointly.

Q. You have not found any difficulty?—*A.* Absolutely none.

Q. The general opinion seems to be that the registration of partnership will be a very good thing, but that it is uncertain if it is practicable?—*A.* I don't think it is practicable.

Mr. C. E. Low.—*Q.* You say, "Thus all British and foreign concerns, especially those which seek Government help of any sort, must be asked to allot a definite proportion of capital to Indians." Supposing Indians do not take it up?—*A.* I have got the alternative scheme of cumulative voting.

Q. But supposing Indians don't take it up, what is to happen to that portion of those shares; who are they to be taken by?—*A.* I don't think that there is likely to be such a contingency.

Q. I can only speak from experience of one case, where a local company was induced to agree to reserve a certain proportion of capital to Indians, and they would not take it up, so my one experience leads me to ask that question?—*A.* They should try to persuade Indians if they care to have Government help.

Q. But supposing they don't?—*A.* They must go without the help.

Q. What is to happen to the money, to the capital of the company, how is the company to get its capital?—*A.* Let them go into liquidation.

Q. Your idea then is that the company should not start; no fresh company should be started?—*A.* Until they are able to secure by some means half the number of Indians either by cumulative voting.

Q. I am not talking about voting, I am talking about capital?—*A.* Until they are able to secure half the directors, no company ought to be allowed to start.

Q. What is to happen to the company?—*A.* Let them have more capital belonging to non-Indians, but they should have half the number of Indian directors even though half the capital is not Indian.

Q. You were speaking about there not being very much dealing in stocks and shares in this presidency. Do you think a stock exchange would be a good thing?—*A.* It would be a facility.

Q. How often would you have settlements?—*A.* We have not got any settlements in Madras. It is a matter of mutual agreement in each transaction.

Q. If you had a stock exchange how often would you have settlements?—*A.* That would depend upon the amount and nature of business.

Q. Is it not dangerous to have settlements at long intervals?—*A.* Yes, it should be at short intervals.

Q. What do your deposits amount to?—*A.* About 34 or 35 lakhs.

Q. Do you finance any industries apart from the provision of working capital, do you supply money for the actual erection of works?—*A.* Our bank is not modelled on that line, it is more a commercial bank for short credits.

Q. Like any other bank in India?—*A.* Yes. Some of the articles would have to be modified if we want to go into any other kind of business.

Q. Have you had any such application?—*A.* No, we have had none. Of course we have financed a few small concerns but we cannot call that financing any particular industry.

Q. I don't want to pursue your historic dispute with the Bank of Madras, but I should like to understand one or two points about it. Who elect the directors of the Bank of Madras?—*A.* Practically they elect themselves.

Q. [illegible] I want to know the [illegible] on the subject?—*A.* It is open to the shareholders [illegible] these.

Q. [illegible] Directors, [illegible]

[illegible]

Sir F. H. Stewart.—*Q.* Do your shareholders come to your meetings?—*A.* Yes, in large numbers.

Q. And experience in India shows that when things are going well, shareholders do not bother about meetings?—*A.* Yes, that is why I deplore the apathy and ignorance of shareholders.

Mr. C. E. Low.—*Q.* There are a good many Indian shareholders here?—*A.* Not many; but as they have to deal with the bank they cannot afford to displease the bank. These shareholders also borrow from the bank.

Q. Then apart from the question of the Indian representation on the bank, with which I don't think we are concerned as a commission, the Bank of Madras—if I understand rightly—is precluded from lending on industrial security. Then is your proposal that the Presidency Banks Act should be amended so as to allow the banks to lend on industrial security?—*A.* Yes.

Q. With of course the necessary modifications in their capital organization, etc., to enable them to do so?—*A.* Yes.

Q. You recognize that it would be dangerous to lend on industrial security money which is on short term deposit?—*A.* Yes, but they can make a corresponding change and receive long term deposits.

Q. We are assuming that the constitution of the bank is amended to enable them to lend on such kinds of security. How are the banks to raise the funds which can be locked up in this kind of loan?—*A.* I would prefer separate banks to be started who would undertake that business, but if the Presidency Banks want to have commercial as well as industrial undertakings, they must modify their constitution.

Q. Supposing you have separate banks. How would a separate bank started to finance industries raise the funds?—*A.* Partly by capital, partly by receiving deposits, partly by issuing debentures.

Q. Supposing you are going to finance the erecting of factories?—*A.* That would depend upon what kind of factory?

Q. Take an oil mill or sugar factory?—*A.* One of their experts will have to advise as to how many years they should finance the concern, taking their plant, machinery, etc. Probably it might go to five or seven years the first arrangement.

Q. Then the bank would either have to entertain, or be able to obtain the services of experts?—*A.* Of course, in the case of an industrial institution. In Lord Farringdon's Report they have given a fair idea.

Q. That was more concerned with the financing of commerce than that of industries?—*A.* More industries, manufactures.

Q. But it was more a question of overseas trade rather than actual industries?—*A.* Yes.

Q. Take the case of oil mills, would the bank require an expert oil manufacturer, or would an accountant or business man used to dealing with oil mills be sufficient?—*A.* Probably they would require two or three people to look after all the sides.

Q. I mean to advise them on first application of that sort?—*A.* Probably the Director of Industries or Advisory Board would be able to help them to a certain extent. They will also require their own staff to advise them.

Q. In any case a bank would require technical experts?—*A.* Yes.

Q. Do you think the position would be the same if you added the same kind of industrial business to the existing presidency banks?—*A.* No, I think they should have separate institutions.

Q. Why?—Because it is difficult for the same man to run two different policies?—*A.* It would receive undivided attention.

Q. You mean that the management of an industrial bank is a job for an expert in his own line?—*A.* Yes, it is a special branch of banking.

Q. You don't know of such banks in any country outside Germany or Japan?—*A.* No, I have not gone into details.

Q. There is none in India or in England as far as you know?—*A.* In England some of the banks do finance particular industries, though they don't call themselves industrial banks.

Q. Not the usual industrial security?—*A.* They finance industries.

Q. All banks do that, but the point is whether the security is simply bricks or mortar or something collateral?—*A.* They lend against debentures or shares of certain industrial concerns.

Q. We came across a case of this sort. Co-operative credit societies lend money to people to pay off their debts. A member of this society mortgages his land to the society. The society takes loan from the central bank and gives it to the borrower. The society re-mortgages that land to the central bank and the central bank ultimately to the provincial bank. The central bank or provincial [illegible] public issues bonds to the value [illegible] money from the tself by mortgage [illegible] and secured [illegible] public it would depend upon the nature of the business; if it is well-known and popular, the debentures would sell at once; in the other case they would lie on the hands of the bank.

Hon'ble Pandit M. M. Malaviya.—*Q.* You suggest in your written statement that in order to encourage Indians to take to industries "all British and foreign concerns, especially those which seek Government help of any sort, must be asked to allot a definite proportion of capital to Indians." You have said in answer to one of the questions that you would go to the length of not allowing the companies to start business until those conditions were fulfilled. You do not insist upon half the capital being Indian but you insist upon half the directorate?—*A.* Yes. If we can get the capital also, so much the better.

Q. Have you any apprehension that if such a rule was introduced, Indian capital would not be forthcoming?—*A.* In good concerns I expect it will come.

Mr. C. E. Low.—*Q.* You would not mind from what part of India it came from, so long as it was Indian capital?—*A.* No. I don't.

Sir D. J. Tata.—*Q.* Do you distinguish between Native States and British India?—*A.* I had not that in mind, but I was thinking of you Bombay financiers.

Q. Because I might state that a large part of the capital of some of our recent undertakings has come from Native States. You would not object to that?—*A.* Certainly not, that is welcome.

Hon'ble Pandit M. M. Malaviya.—*Q.* You think if the information is made public regarding the future possibility of the development of industries, Indians would be willing to subscribe in a larger measure than heretofore?—*A.* Yes, provided they get also control in the management.

Q. Which do you consider of greater importance; having half the share capital or having half control over the management, or both?—*A.* It would be a fair thing if they go in for half the share capital and get control.

Q. You say that the desire to be assured by an independent authority other than the promoters, regarding the possibility of success is what Indians want before undertaking any enterprise. What method do you recommend to bring that about? The publication of information by a Bureau or a Department of Industries regarding the proposed industry?—*A.* If the Director of Industries or a Government department has examined the scheme and think they are competent to advise on it and if they issue information to the public, that is likely to inspire confidence.

Q. You expect the Department of Industries to examine the possibility of a new enterprise in a province and after consulting expert advice to publish the result for general information?—*A.* Yes, and if they can associate themselves actively in promoting the industry, that would be still better.

Q. In what way? In advancing money or lending machinery?—*A.* Not merely that, but also in persuading banks to take an active part in bringing it about. Any active part would be helpful.

Q. Your proposal comes to this that the Government should undertake banking legislation in order to provide various kinds of financial facilities for the encouragement of trade, doesn't it?—*A.* Not only trade, also industries.

Q. I mean industries and trade?—*A.* Yes. Even for agricultural development. If you require any banking institutions, let that also be taken up.

Q. The existing banks being merely organised to help commerce, they cannot help industries, and therefore you must have institutions that will have as their special object the helping of industries?—*A.* Yes.

Q. You speak of the desirability of having savings banks, penny banks, land banks, etc. Do you mean that this should be an extension of existing Government institutions, or do you contemplate institutions working under an Act but independent of Government?—*A.* I would prefer independent institutions being started, but if that is not possible Government help will inspire confidence. It is more with a view to mobilise funds. The present poor population have no means of keeping their money in any safe place.

Q. Are they not availing themselves more and more of the Postal Savings Bank?—*A.* I don't think it is quite so popular. It would be made more popular if it is properly worked.

Q. Supposing they were better worked and made more popular, would they serve a need or would you still recommend the establishment of other savings banks?—*A.* Yes, because they would be more free in lending the money. With the money deposited in the Government Savings Banks the Government has to take great care of it, and cannot invest it freely.

Q. But you would certainly want these banks to be under an Act?—*A.* Yes, in order to safeguard the deposits.

Q. What are these penny banks that you speak of?—*A.* I have seen two penny banks in England, one the Yorkshire and another which has failed now, the National Penny Bank in London. The Yorkshire Bank receives deposit of even a penny and has deposits of nearly twenty million pounds from only one district. Any person, boy or girl, if he has got a penny, can go there and deposit it. They send their staff to the schools on certain days and English boys deposit their pennies out of their pocket money by way of saving. They have got about 800 branches in one district.

Mr. C. E. Low.—*Q.* The bulk of the deposits are of large value, more of the pound business and less of the penny?—*A.* They begin with the penny. That depends upon the district where the particular branch is working. Say if it is a large street, the shopkeepers begin with a large amount. If it is in the slums, it begins with a penny.

Q. What I have seen of the working of the institution is that they are doing much less of the penny business and more of the bigger business?—*A.* Because they have encouraged thrift.

Q. What I mean is that the whole of the millions did not come out of the pennies?—*A.* In the beginning it did. Not the whole of it; the others also deposited money there.

Hon'ble Pandit M. M. Malaviya.—*Q.* Do you think such a bank will be very helpful in promoting thrift?—*A.* Yes.

Q. You suggest land banks also. Do you mean that these also should be Government institutions or institutions helped by Government?—*A.* Helped by Government.

Q. Like the Hypothec Bank in Japan?—*A.* I don't know the rules of this bank. They would be more mortgage banks.

Q. Are not existing banks doing business in mortgages?—*A.* No, certain banks did, but they came to grief.

Q. But the Allahabad Bank does much business in mortgages?—*A.* The Bank of Upper India came to grief on that account. It depends upon the valuation of the property.

Q. You think that it is desirable that there should be special Land Mortgage Banks?—*A.* Yes, for agricultural purposes.

Q. Don't you expect that private enterprise will create such banks, or do you think it is a matter in which Government should come to their help by pioneering?—*A.* Unfortunately we rely more upon Government help at present, and to make a beginning I think there should be Government help.

Sir F. H. Stewart.—*Q.* I understand from what you say about savings banks that if private enterprise did come forward you would prefer that?—*A.* Yes. In that case I would abolish the Government savings bank if it interfered with private enterprise.

Hon'ble Pandit M. M. Malaviya.—*Q.* You have suggested that a Banking Commission should be appointed. Don't you think that the object could be achieved by a shorter and less prolonged method?—*A.* If you can do it, all the better.

Q. You require all questions connected with banking to be taken up by this Commission, to deal with all aspects of the question and submit a report after visiting other countries also?—*A.* That would be very desirable no doubt.

Q. But that would delay matters very much?—*A.* Yes.

Q. Don't you think that you gentlemen of the banks should put forward a definite scheme for examination by Government through this Commission?—*A.* Yes, if you can bring about co-operation among the bankers.

Q. The Government has invited evidence from the banking community and we expect that you gentlemen will help the public by putting forward definite proposals?—*A.* Yes, the bankers might be called upon to do that. If the Commission makes such a request, probably they will do it.

Q. You have spoken of Lord Farringdon's report relating to banking. So far as the internal development of the industries of India is concerned do you think there should be at least one provincial bank to help industries, or do you think one would be sufficient for the whole of India?—*A.* I think it would be better to have banks in different provinces when they are big and when they are small they may be grouped.

Q. You have suggested that Government might in some instances guarantee interest to encourage enterprise in particular directions. Do you think that, if Government guaranteed interest on industrial provincial banks, say, for five or ten years at the rate of 5 per cent that will attract private capital to the undertaking?—*A.* Yes, it will inspire more confidence.

Q. Do you think that if such a bank was brought into existence, it would be able to finance industries? Of course it would be started with that object in the province, and the need for direct help from Government would be minimised?—*A.* Oh yes, probably the Government will have to put part of their money with them.

Q. The Government may deposit part of their money. You think the cash balances should go to help the bank?—*A.* Yes, some of them.

Q. [illegible] when the Government [illegible] interest, is that not substantial help? [illegible] will be additional help.

Q. Some of the balances without interest, as they do in presidency banks?—*A.* Yes, without interest, or they may charge a little interest.

Q. At present Government do not charge any interest to the presidency banks?—*A.* Not so far as I know.

Q. But you are willing that in the case of these industrial banks the Government may charge interest when the balances go beyond a certain limit?—*A.* Yes.

Q. Would you make a similar suggestion in the case of presidency banks?—*A.* Yes.

Q. You suggest a re-casting of the Presidency Banks Act in order that shareholders should have the same rights as those of joint stock companies. In what respect do they not possess that right at present?—*A.* In the case of a joint-stock concern, any shareholder can go and inspect the shareholders' register, which is not provided for in the Presidency Banks Act.

Q. Is there provision in the Act against it?—*A.* There is nothing in the Act by which a shareholder can exercise this right and the Presidency Bank did raise that objection. They asked under what section a shareholder asked for such inspection.

Q. Have you any case within your knowledge in which such a thing has happened?—*A.* Yes.

Q. That the bank has refused to allow a shareholder to inspect the shareholders' registers of the bank?—*A.* On two occasions to my knowledge this happened.

Q. A bank constituted under the Companies Act cannot do so?—*A.* No, they have to show even to an outsider if he pays a fee.

Mr. C. E. Low.—*Q.* Any company, if it is a bank or not?—*A.* Yes. He may even go to the Registrar and pay a fee and inspect it for any number of years.

Hon'ble Pandit M. M. Malaviya.—*Q.* How are shareholders of the Presidency Bank injured by this right being withheld from them?—*A.* They cannot take concerted action. They don't know each other and cannot know.

Q. But so long as they get good dividends would they care to take concerted action in any direction?—*A.* They care more for the dividends at present than for anything else.

Q. Do you know of any case in which they have desired to take concerted action and have been debarred by the denial of this privilege?—*A.* Yes, I know of a case that is referred to in my letter. The Southern India Chamber of Commerce said they wanted an Indian on the Board. Some of the members did not want to take open action because they had business connections with the bank. There was a letter written by a shareholder in June 1914, first he applied for a list of shareholders. He was asked under what section he applied. He wanted also some other information in that connection; for instance, the Presidency Banks have got the maximum number of nine directors under the Act. Our local Presidency Bank have seven directors, so they can fill up two other vacancies. He wanted to know whether at any time those seats were filled up and whether those two vacancies could be filled up. The bank did not reply but asked under what section he wanted the information.

Q. What year was that?—*A.* That is dated 30th June 1914.

Q. Is that a letter from the bank?—*A.* Yes.

Q. What happened, what was the result, was he able to get the information eventually?—*A.* No. Even this year I know of a shareholder who applied similarly for information, and he was entitled to get the list. They first put him similar questions and finally sent him a list of the shareholders without any addresses which was practically useless.

Q. When they supplied the list of shareholders they would not object to supply the addresses?—*A.* They have refused; they said the matter was being considered and that he would hear from them.

Q. That is pending, and so we cannot draw any inference from that. The second suggestion you make is that shares might be held more largely in India and by Indians. Are not a good many Indians at present shareholders in the Presidency Banks?—*A.* If you will turn to my memorandum,* I have given an analysis of the shareholders for 1913. It gives an analysis of shareholders, showing the number of ladies. Then we have 325 others who have not got any right to vote.

Q. But the total number of Indian shareholders is 181 and the European 762?—*A.* Yes, but we don't know how many of them are in India. Most of them are supposed to be outside.

Sir F. H. Stewart.—*Q.* Is it the same with the Bank of Madras shares as with other shares here that there are a very few transactions in them?—*A.* We have very few transfers. They are practically fixed investments.

Q. The Bank of Bengal shares are dealt in very freely; it is not so with the Bank of Madras shares?—*A.* No. We wanted to get some shares in order to move in the matter. I had to go to Bombay to buy them, i.e., to buy shares of the Bank of Madras. It is so manipulated here that we cannot get any shares.

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* Not printed.

Hon'ble Pandit M. M. Malaviya.—*Q.* Those who enjoy certain advantages want to retain them?—*A.* Yes, but it is equally natural for others to want to share in the advantages.

Q. You say that most of these European shareholders are non-resident in India. You have no definite information?—*A.* But you can take it safely that they are mostly out of India.

Q. How do you suggest an alteration should be made in the Act, so that shares should be held more largely by Indians; what restrictions would you propose?—*A.* You mean legislative.

Q. You suggest that the whole Act requires to be re-cast, so that certain objects should be attained. This is one of the objects that you mention. How do you suggest this should be brought about?—*A.* In the first place if the shares are subdivided, they will be more largely taken here in India.

Q. What are the shares at present?—*A.* Rupees 500, the market value about Rs 1,300 at present

Mr. A. Chatterton.—*Q.* There are half shares now?—*A.* But that does not carry any right to vote or speak.

Hon'ble Pandit M. M. Malaviya.—*Q.* Would you suggest that preference should be given to Indians as defined by statute in regard to the transference of shares?—*A.* Yes, if possible. I think if they open the Board to Indians there won't be any necessity for legislation.

Q. You think if Indians are put on the Board of Directors, all the other reforms you have in mind would be brought about?—*A.* The necessity for their being held in India and preventing their going out of the country, will vanish.

Q. What proportion would you suggest?—*A.* There are seven directors at present.

Q. But the Act permits of nine being appointed. How many of these should be Indians. You have to remember that the number of Indian shareholders at present is only 181 as against 762 Europeans?—*A.* If you make a beginning at three gradually they will get more.

Q. You think that if three Indian directors were elected, that would help matters?—*A.* That will make others work and see that they get into it. They will take more interest in it.

Q. Has no Indian been appointed a director up to this time?—*A.* No.

Q. Has any attempt been made?—*A.* On one occasion it was proposed but not carried.

Q. When was that?—*A.* It was in 1914 or 1915.

Q. Was it a big shareholder or a small one?—*A.* The name proposed was probably one of the biggest.

Q. Could you tell us who it was?—*A.* Diwan Bahadur Govindas Chathurbhujadas.

Q. He was not elected?—*A.* The majority did not take him.

Q. Did it go to vote?—*A.* It was voted upon and the majority voted against him. They were mostly European.

Q. Was there any other instance in which an Indian was defeated?—*A.* No, they never tried again.

Q. The third thing you suggest is that the "powers to grant loans on certain securities may be revised and widened." I suppose you suggest that in order that banks should lend money on the security of buildings and plant and machinery and stocks of industrial concerns?—*A.* I don't say about buildings. If there are debentures guaranteed by Government, the Presidency Banks may be allowed to lend under those securities; for instance, the District Board railways have been recently introduced in the Presidency Banks Act. Up to now they were not there.

Q. Would you also recommend that they should be allowed to lend on the security of buildings and factories and machinery of factories?—*A.* I don't think they can do that under the present constitution.

Q. I mean with the altered constitution you suggest?—*A.* If they have to take industrial finance, then they may. I would prefer separate institutions.

Q. You are not in favour of Presidency Banks doing that?—*A.* No.

Q. You say that "existing institutions controlled and managed by Indians should be encouraged by lending or keeping Government funds with them under proper safeguards." Don't Government at present keep any of their funds with Indian banks?—*A.* Not that I know of.

Q. What safeguards have you got in mind?—*A.* Say they may be called upon to furnish some security.

Q. What kind?—*A.* Government securities.

Q. You think that banks called upon to deposit Government security will do so?—*A.* If they are to be given any funds in particular places; for instance, if there is a place where the Presidency Bank has not got a branch, and another bank has got a branch, they may call upon the bank to put in security for the balance there. It would carry the Government prestige which the Presidency Banks now enjoy.

Q. You advocate the establishment of new banking agencies in order to tap Indian capital. Do you think if more banking agencies were started, that Indian capitalists would make deposits and would support these banking agencies to any large extent?—*A.* Yes.

Q. Without any Government support?—*A.* No, I mean if the Government give them support, they will go with that prestige and be able to secure deposits speedily and in larger amounts.

Q. You suggest that in the development of those industries Government should promote technological and scientific education, and should increase its unproductive debt by about 10 crores in spreading technical and scientific education and in establishing first rate science libraries throughout the country. Do you think that that would be good business from the national point of view?—*A.* Yes.

Q. Do you expect it will lead to great development of industries, which will repay the amount Government will spend?—*A.* Yes, ten-fold.

Q. You contemplate these proposals you make would involve a recurring expenditure of a crore of rupees?—*A.* I roughly put it at a crore.

Q. That would go a great way to spread technical and scientific knowledge in the country?—*A.* I think so.

Q. And you think that will encourage Indians to invest money in new enterprises?—*A.* Yes.

Q. You have suggested the establishment of a college of commerce. Is there any existing arrangement here at present for imparting commercial education?—*A.* We have got one technical institution at Calicut, and the Government of Madras have been thinking of having a commercial institution there.

Q. It is to be in Madras, not in Calicut?—*A.* No, the Calicut one would continue and they would have another in Madras.

Q. Do you think that commercial education should be imparted, not only through the medium of English but also the vernacular, in order that it should reach the Indian workmen community?—*A.* Yes.

Q. And a large number of men who are engaged in trade or industry at present ignorant of the English language?—*A.* Yes. Our Southern India Chamber of Commerce were running a paper giving market quotations and other things.

Q. In what language?—*A.* In Tamil. That was a paying business while an English edition did not pay itself.

Q. Is that paper still going on?—*A.* The English issue has stopped; probably the Tamil is going on, I am not quite sure.

Q. You have suggested that the Director of Industries should preferably be an Indian of experience. Do you think that in view of our present industrial progress, you will find many men competent to take up the post?—*A.* I think so.

Q. What is the particular advantage that you have in view by the appointment of an Indian?—*A.* He will view things from the Indian point of view.

Q. Would he come in greater living touch with Indians engaged in business?—*A.* Yes. Our experience in the co-operative movement has been that we always had Indian Registrars and the movement has gone on very well; in fact co-operators have petitioned the Government that they should not appoint any European as Registrar of Co-operative Societies.

Q. You suggest that "all foreign companies, as defined in the Indian Companie Act, should be required to file, besides the company's balance sheet, a special balanc sheet showing the assets and liabilities of the Indian business, and also its profit an loss account." What particular advantage have you from such a course being followed —*A.* In order that the public can have an idea what the profits are, and how they ar arrived at, and what is the income of those alien concerns in India.

Q. Is there any such rule in any other country that you know of?—*A.* There ar certain countries where they insist upon production of such a balance sheet.

Q. For instance?—*A.* I think it is in Austria and some other places; in fact i the Registrar of Joint Stock Companies now requires, he may call for it, but I don' know if he ever does.

Q. You also suggest that alien firms should be required to disclose their partner What is your object? Do you want that the Government here should know ho much business is being done by aliens in this country?—*A.* It will certainly go to sho how much of it is outside. At present we don't know how much is German or Englis or even Indian.

Q. What is the total number of joint-stock banks, including branches of the Pres dency Bank, that exist in this presidency?—*A.* There are a number of institutions. W have a large number of "Nidhies" here.

Q. Are they banks registered under the Joint Stock Companies Act?—*A.* Yes, bu they are more or less small funds. You cannot call them banks; they are somethin like benefit societies.

Q. But what is the number of banks you have here at present; has the Presidency Bank branches in every district?—*A.* No, according to my last letter they had no branches in 17 out of 24 districts.

Q. Among these 17 is there an Indian bank?—*A.* In some places there are, but they are very few, not more than one half a dozen.

Q. You think that the absence of banking facilities in these places is obstructing the growth of enterprise?—*A.* Yes, considerably.

Sir F. H. Stewart.—*Q.* Why don't you go ahead and establish more branches?—*A.* We are trying.

Q. Do you find much difficulty in staffing branches; can you get competent men to put in charge?—*A.* Yes.

Mr. C. E. Low.—*Q.* How many branches have you got?—*A.* Two outside—Madura and Cocanada—and two in the town.

The Hon'ble Pandit M. M. Malaviya.—*Q.* You are in existence only since 1908?—*A.* We began about the end of 1907.

Q. So far as the export and import trade is concerned, that is increasing well enough at present?—*A.* Yes.

Q. You want these additional banks in order to promote indigenous industries?—*A.* And local trade also.

Q. I see from one of your letters that the Presidency Bank of Madras advanced as much as 73½ per cent. in 1916 to Indians, and only 87 lakhs to non-Indians. Does that not support the Indian enterprise more largely than European?—*A.* As I have explained in one of the letters it goes to a certain extent to help Indians connected with that kind of business, but it does not mean it supports indigenous enterprise. They are merely agents for foreign imports and exports.

Q. You mean that they are concerned in that sort of business, or are they agents for larger firms?—*A.* They are practically a set of Indian merchants who are engaged in imports and exports. In some cases they are independent.

Q. You cannot say how much of this has gone towards supporting other industries?—*A.* No, I cannot say anything.

Q. There is no information on that point available?—*A.* No.

Q. Your whole complaint is that the Presidency Bank has no systematic scheme for financing Indian industries, but you recognise that the Presidency Banks Act must be modified before that can be done?—*A.* If there is a will there is a way.

Q. You think that they might do more under the existing Act?—*A.* Yes, to some extent.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Is the capital of your bank 10 lakhs?—*A.* Yes.

Q. And you have got deposits of 35 lakhs?—*A.* Yes.

Q. And you are doing only financing business, bill and hundi business?—*A.* The ordinary business carried on by any other joint-stock concern.

Q. What joint-stock concerns?—*A.* Take for instance your Alliance Bank, or any of these banks, or the Presidency Bank.

Q. You think that a lot of money ought to be given to industries; why should not your Bank finance the industries?—*A.* It will be for the shareholders to so modify the constitution, and then for the secretary and the directors to work it out.

Q. It seems the shareholders and directors think it much safer to lend in this way than to industries; when they started the bank they thought it was a better thing?—*A.* It was started ten years ago by certain people who were interested in this kind of business. They are mostly commercial people in my bank.

Q. Then you say, "It should be made quite clear to all concerned that no financial help or concession of any sort will be given by the Government to any business in India unless half the number of directors on the Board of Control of such establishment in India are Indians, and all things being equal, Indians are given preference in all departments of working". You are more keen on the directors than on the shareholders. Supposing a concern is started with three crores of capital; 1½ crore is offered to Indians, and suppose they take 10 lakhs. Still you wish that half the number of directors should be Indians?—*A.* I have said so.

Q. Do you think if half the number of directors is not in it, it should not be started?—*A.* No.

Q. You would allow it to start if there were Indians there?—*A.* I would. I know of instances in Spain where two-thirds of the directors of a railway concern are supposed to be Spanish, whatever may be the capital.

Q. You are not in favour of the proposition that unless Indians subscribe half, the concern ought not to be started?—*A.* I won't go so far.

Q. Then you say, "What Indians want to be assured of in the first instance is that success will be attained." They must have money like Government paper, and must have safety. They don't want to go into concerns where they can lose money?—*A.* Everybody wants to be protected.

Q. They must risk something, but you say they don't want to?—*A*. The fairest arrangement would be to subscribe half.

Q. You say, "What Indians want to be assured of in the first instance is that success will be attained. They fear that for want of technical and expert mastery of the details of the business, it may not prove a success." They want to put their money where the money can be kept with security, or else they won't go. They want industries to be like Government paper; then only would people put their money in?—*A*. If you like you can put it that way. There would be others who will be willing to venture, provided they were given more control.

Q. If there was risk or no risk?—*A*. They might take the risk if they were secured in regard to the control.

Q. With regard to the Presidency Bank, is the general complaint on sentimental grounds; do you want Indian directors, or that Indians should get more facilities?—*A*. It is not a question of sentiment, but for Indians to get more facilities.

Q. Have any Indians been refused help in business?—*A*. Yes, to my knowledge they have been declined.

Q. On what grounds—because it was an Indian concern?—*A*. Yes.

Q. And therefore they refused on that point only?—*A*. Yes.

Q. Have you any objection to give that instance in confidence?—*A*. On a previous occasion I gave instances and the people have suffered. I have drawn the attention of two officials of the Government to this matter.

Mr. C. E. Low.—*Q*. Did the bank allege the reason for their refusal?—*A*. They declined to give any.

Q. Why do you say that the refusal was made because the concern was Indian?—*A*. Generally Indians do not get facilities as other concerns get.

Hon'ble Pandit M. M. Malaviya.—*Q*. You say that on a previous occasion you gave names to Government officials?—*A*. One official in particular.

Q. And you say some trouble accrued from it?—*A*. Yes, the parties suffered.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. You have no objection to say whether it was an industrial or commercial business?—*A*. It was purely an Indian merchant. Indian firms don't get such facilities generally as Europeans.

Q. But as far as I can read from your papers, Indians are more financed than Europeans?—*A*. The number is large.

Q. The percentage is more?—*A*. The amount should be largely taken into consideration; the number of Indian and European firms that are financed; take it *pro rata*.

Q. Has the Presidency Bank lost any money there?—*A*. I don't say they have lost anything.

Q. I think when dealing largely with Indians, when they have got Indian directors, it would be more useful to know whether the party is sound?—*A*. In the interests of the bank itself it is very necessary.

Q. I think that forcing one of your directors on the Board will not meet matters at all, and the proposal would be negatived by the majority?—*A*. That is why we don't want to have a quarrel with the bank.

Q. On our side nearly the majority of shareholders are Europeans, but we have got Indian directors?—*A*. I hope they have not suffered.

Q. No, they have benefited?—*A*. I believe they will benefit here also.

Q. In a harmonious way you may be able to get your wish?—*A*. We have tried that way without success.

Hon'ble Pandit M. M. Malaviya.—*Q*. Even from the point of view that a large part of the bank business is done with Indians, you say that the banks should have Indian directors?—*A*. Yes. I know a case where it was proposed that Indian directors should be appointed, but it was not carried out.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. In regard to industries, you say "Where there is a will, there is a way." In what way should the Presidency Bank advance money to industries? They are not able to advance at present on materials or buildings or anything like that. Do you want them to do that?—*A*. No, I want separate banks for that. And those banks may be financed by the Presidency Bank; they may render them help.

Q. You say, "Powers to grant loans on certain securities may be revised and widened." Don't you think under the Presidency Banks Act they don't give money unless they get two signatures one of which may be very good, and the other not particularly so?—*A*. As I pointed out, that descends into something like a "gentleman and his groom."

Q. Don't you think that if they got one safe party the Act should be amended, and the name of the one party should be sufficient?—*A*. Probably they find it necessary to go through this farce.

Q. You want to continue this farce?—*A*. It ought to be worked in the spirit.

Q. Suppose a man is worth a crore of rupees, and he wanted fifty thousand rupees; is it not absurd to get another man's signature? It is the bank's business to know if the party is sound, instead of having two signatures?—*A*. Yes.

Q. As you have said, an industrial bank should be started with a Government guarantee and that money should be given on plant and other things by this bank?—*A*. I don't think I have said anything like this.

Q. You said in reply to the Honourable Pandit that you are agreeable to have industrial banks?—*A*. Yes, industrial banks will have to shell out money like that.

Q. Suppose in Bengal you have a bank with a crore of rupees capital; and with Government guarantee, and they have not got any industrial concerns; don't you think that in the meantime they can keep on doing ordinary banking business until the industrial concerns are started?—*A*. It may be started with a smaller capital, and further capital might be introduced gradually. I don't think the Presidency Banks will tolerate rivals.

Q. Is the bank rate here higher than in Bombay or Bengal?—*A*. The rate could be reduced. It is not specially kept up for that bank's benefit. It helps all the banks. I won't blame the Presidency Bank for that.

Sir F. H. Stewart.—*Q*. Is your bank included?—*A*. I do include it. When we regulate the rate according to the bank rate, and the bank rate is up, we all profit by it, but there is a large business which is done below bank rate.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. You think if a college of commerce is established, and the boys pass through it, they will be employed. Is there a lot of scope for them here?—*A*. They will get employed. Though some institutions don't attach much value to that kind of education.

Q. Do you think if the money is given freely, more industries will be started; what industries could be started in this presidency?—*A*. I don't know how much the different industries would require.

Q. Do you think there are any new industries that could be started?—*A*. Yes.

Q. Are there any in your mind which are stopped because there are no means of financing them?—*A*. I cannot point out any particular industries, but that is the general condition.

Q. You say "Government should invariably guarantee purchase of products of local manufacture. Preference should always be given to local manufactures over exported articles even at a little sacrifice." I suppose sacrifice in money and not in quality?—*A*. If the Government department can manage, I don't see why they should not. Consistent with the efficiency; they need not have highly finished articles.

Q. *Sir D. J. Tata*.—*Q*. You mean they should pay a little more?—*A*. Yes.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. Or that they should take a little inferior article if suitable?—*A*. Yes.

Q. Are you getting deposits very freely?—*A*. Not very freely. We are getting them slowly.

Q. Because there is Government money in the Presidency Banks the people think them more secure?—*A*. Yes.

Q. Do you want that Government should deposit money in the other banks? Must they also come under the Presidency Banks Act?—*A*. Not under the Bank Act.

Q. Why should they have preference over the Presidency Banks? The Presidency Banks have a lot of things which they have had to sacrifice. Before they were brought under legislation they had their own notes and other facilities which are now gone. There are a lot of disabilities on account of the Presidency Banks Act, but there is security as regards funds. If you want the Government money to go to other banks, don't you think they should also come under the Presidency Banks Act?—*A*. Suitable safeguards should be provided.

Q. The same safeguards?—*A*. I am for giving further facilities to Presidency Banks, but both should be brought under the same conditions.

Sir D. J. Tata.—*Q*. I did not quite catch all the questions which Sir Francis asked you in the first instance, and did not quite gather your replies. It was with reference to what facilities there are in this country for training in the business of banking. You said they were none?—*A*. Practically none.

Q. My information is that banking is a special honours subject in the curriculum of the University of Bombay for the Bachelor of Commerce degree. You don't think that is a suitable manner of instruction in banking?—*A*. I don't know the exact curriculum in Bombay in regard to teaching in banking. I was thinking more of our Presidency.

Q. I believe that during the vacation banking students of the Sydenham College of Commerce and Economics in Bombay are encouraged to go into banks and apprentice themselves in some way?—*A*. I don't think banks here take apprentices in that way.

Q. Referring again to another point, I would like to elaborate it further. Everywhere we have heard this story about Presidency Banks not advancing money to Indian concerns. I would like you to let us know frankly why? Is it out of the desire to keep back

Indian aspirations?—*A*. I don't mean that. I mean they are not quite in touch with the Indian public, and as such, don't know what are their requirements. Probably they have not got proper means.

Q. That is quite a different thing. Everywhere we have heard that this is a grievance, and they make out that it is because they are not fairly treated; but don't you think it is possible that it is a want of knowledge of the position of the parties applying?—*A*. It is partly due to that; but even after the thing is brought to their notice they don't seem to move in the right direction.

Q. And the remedy you suggest is that there should be Indian directors who would inform other directors as to the position?—*A*. Certainly, as I have noted in my note here in the case of the European concerns, the directors of the Presidency Bank and the Exchange Banks know the concerns very intimately, that is why there is more confidence and the thing goes on more smoothly.

Q. You don't attribute any motive underlying it?—*A*. It is because they don't remedy the thing after being informed, that one is led to think that it is from rivalry.

Q. It is an unfair suggestion to make?—*A*. We have been trying for years to get Indians on the Board, but they have not taken them.

Q. Going back to another question, in your replies to several of the questions asked you as to whether if there were not a sufficient number of Indian directors on any concern, you would not like to see that industry flourish. I want to put it to you that there are three different ways of working. First of all, say the needs of India in any particular direction are met by an industry that is outside India altogether. You would naturally like that that particular article, which is manufactured abroad and introduced in the country, should be manufactured here. The other thing is that it is manufactured entirely in India by Indian capital. Naturally we would all desire to see that. But is there not a mean between the two? Supposing we can get Indian capital and Indian enterprise to take up the manufacture of any article in the country itself, would it not be of some advantage if foreign capital came in to a very great extent, manufactured that article in India, found employment for Indian labour, and in a way pioneered the work which could later on be taken up by Indians? We are not quite ripe to take up things straight off; and perhaps the experience gained in this way might lead later on to our carrying out these industries in this country itself, so if you are desirous that Government should pioneer industries, why not take foreign capital?—*A*. Yes, take part of it in foreign capital.

Q. When I say "foreign capital" I exclude any but British capital. You say that even if it is three-fourths or four-fifths English capital, if there are not enough Indian directors you would not like that industry supported. Is it not an advantage to have them financed even by foreign capital?—*A*. That would only mean exploitation of that industry. If it is necessary in the interests of the country, as an exceptional case, it might be allowed.

Q. Why as an exceptional case, if it is in the interests of the country?—*A*. Then we would not have a beginning in the right direction. There are instances where things were allowed and were not set right. Take the cotton industry, it is suffering under the excise duty. If you introduce it in that half-hearted way, you are not likely to get that experience and finally that control.

Q. If we are not in a position to work it ourselves, and if our people are not ready to find the money, and if English capital is very much larger in proportion, how can you expect them to give an equal voice in the management?—*A*. They must give us half the directorate. If they want to set us up on our legs, they should take us in order to give us experience.

Q. There is a sentence in your written evidence. "It is hardly necessary for me to instance the case of Bombay, where there has been closer co-operation between British and Indian businessmen, with the result that Indians have undertaken great enterprises and Indian capital flows to some of these concerns from all parts of the country." What do you mean by "closer co-operation"?—*A*. That is as partner or fellow-director on a concern.

Q. That is Indian concerns should take Englishmen as partners?—*A*. Indian concerns have taken English partners.

Q. Why is it that these things are achieved in Bombay and not elsewhere; can you assign a reason?—*A*. The Bombay people were first to be in touch with the British, and they were able to persuade them to take it up earlier.

Hon'ble Sir R. N. Mookerjee.—*Q*. Can you mention any names of English firms who take Indians as partners?—*A*. There are concerns such as Messrs. [illegible] and Price. I think on Tata's concerns too you have got European directors.

[*Sir D. J. Tata*.—No, not one.]

Q. What I mean to say is this. Don't you think it is something inherent in the people themselves, and that an attempt to force a thing without there being a foundation for it in the people themselves would be futile?—*A*. [illegible] foundation.

Q. And that instead of asking that Government and others should try and foster industries and help them, is it not better to try and create a desire on the part of the people themselves to do these things?—*A*. Certainly.

Q. And that more of the effort of those who love the country should be devoted to some sort of missionary work in making people seek to devote their lives to industries?—*A*. Certainly.

Q. It seems to me there is too much asking for outside help without the desire to help ourselves. That is the point?—*A*. We ought to help ourselves, there I agree with you.

Q. Take the sentence of yours. "They fear that for want of technical and expert mastery of the details of the business, it may not prove a success." In all such remarks there is always the cry, "Why doesn't somebody help us?" "Why doesn't somebody make things ready for us?" Don't you think that some attempt should be made to teach people themselves at the beginning?—*A*. Yes, but they require some technical help and advice in certain directions.

Q. In your note you say "There are no brokers or stock exchanges in this presidency." Do you know that underwriting is not a very great advantage, that in Europe in a good many concerns underwriters take away all the cream and leave nothing for the shareholders?—*A*. You have to provide against that evil.

Q. In Europe whenever they talk about underwriting, it means the underwriters get all the cream and the people who take the shares suffer?—*A*. You have to provide safeguards against that.

Q. A little lower you say, "If they are given proper training facilities for gaining business experience and profitable employment for their activities, an intelligent educated class will take to business more and more and confidence in the industrial concerns will be strengthened, and there will then be no lack of Indian capital." Who is to provide employment?—*A*. I mean these concerns.

Q. But then they are to find employment after they had gained experience?—*A*. They will have to be taken and given particular experience, and facilities for this are required.

Hon'ble Sir R. N. Mookerjee.—*Q*. With reference to the last paragraph on the first page of your note "Interest may be guaranteed by Government in the case of those industries the working of which will conduce to the benefit of the whole Indian population or the defence of the country," have you any idea what rate of interest will attract capital?—*A*. Probably till now 5 per cent or 6 per cent; after the war things might change slightly.

Q. What is your idea, for an unlimited period or for a number of years?—*A*. For a limited period.

Q. And if the concern does not pay, the Government must go on paying interest at 5 per cent?—*A*. They will have to examine and see how long it can be worked without profit and they will know what risk is involved in guaranteeing that interest for that period.

Q. Do you think it is possible for any individual man to say at the beginning of an industry that this industry will pay after so many years, or would not pay?—*A*. It may not be possible with that definiteness, but they will get some idea.

Q. Do you think that Government will then come forward to take the risk?—*A*. They have done in the case of railways.

Q. In case the Government does take that risk, will they be recompensed afterwards?—*A*. You may provide that if necessary.

Q. About this Presidency Banks Act, is this the first proposal of yours?—*A*. We have approached the Government and sent memorials. When Sir William Meyer and Sir William Clark were here we had interviews with them. The Chamber is going again to address Government in the matter.

Q. How by altering the Act can you make the shares held by Indians?—*A*. With Indian directors that may not be necessary at all.

Dr. E. Hopkinson.—*Q*. You say that it is difficult to attract Indian capital because Indians distrust each other in commercial matters?—*A*. It is partly due to distrust also.

Q. Why do they distrust each other? I think you say because they have not sufficient technical and business knowledge?—*A*. Yes.

Q. You propose to get over that difficulty by insisting that in every industrial company one-half the Board shall be Indians and one-half English. What is the object of having half the Board Indian; is it in order that they may be instructed in business matters by the English?—*A*. Yes.

Q. You think a Board of Directors is a proper school?—*A*. It is not a school; if you prefer to call it a school I have no objection.

Q. You think that a Board of Directors, which is responsible for the management of an industry, is a proper place for instruction?—*A*. It is a proper place for giving them experience.

Q. Call it a school?—*A*. I won't call it a school.

Q. Well, we call it "a place for gaining experience." You think it necessary to attract British capital?—*A.* Yes.

Q. You don't think it possible that it should be entirely Indian?—*A.* No.

Q. You think that British capital will be attracted to industries in which the Board of Directors is "a place for gaining experience"?—*A.* Gradually after they get experience more capital will be attracted.

Q. Do you think British capital will be attracted at all?—*A.* Not immediately.

Q. How is the capital to be found in the first instance?—*A.* We will have to find it in the country.

Q. But you start your proposition by saying that it would not be found?—*A.* If the capital will not come, we will have to suffer to that extent. The industry will have to be postponed for the time being.

Q. Would that not affect the country?—*A.* I don't think so. Certain industries can wait.

Q. Do you think you would get Englishmen to serve on a Board of Directors where half of them are there to gain experience?—*A.* There will be difficulty.

Q. Don't you think that your whole scheme breaks down?—*A.* I don't think so. I have been relating the instance in Spain where two-thirds of the directors are Spanish and work with British capital in the case of railways. It is the Spanish Company law.

Q. I gather from you that you think that if your plans do not succeed, it will be better to postpone the development of some industries?—*A.* Yes.

Q. You think that although Englishmen like Indians may expect good returns, their wishes ought not to be respected?—*A.* They ought to be respected.

Q. Then you would give Government assistance to English-promoted enterprises in order that they may get good and quick returns?—*A.* Provided they take Indians on the Board. You came back to school.

Hon'ble Pandit M. M. Malaviya.—*Q.* When you say that Indians should have opportunities of getting experience of business on the Board, do you contemplate that Indians who will be on the directorate will be devoid of all knowledge and experience or do you mean that they will be men of business who will gain further experience of the business with which they will be connected?—*A.* Yes.

Sir F. H. Stewart.—*Q.* Could you mention, if you are asked, the names of any business men in Madras who would be regarded by the Indian community as strengthening the business capacity on the Board of the Bank of Madras?—*A.* Yes, a number of them.

Q. Who would be regarded as strengthening that Board from the business point of view?—*A.* Yes.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* They have no lawyers or solicitors on the directorate?—*A.* Two solicitors on the Board of the Bank of Madras.

Hon'ble Pandit M. M. Malaviya.—*Q.* What you contemplate is that such Indians should be taken on the Board of Directors who are men of business experience and reputation, though they may not have particular acquaintance with particular industries with which they are going to deal?—*A.* Yes.

Q. You think that their presence on the Board will be of some help to the managers of the industries, to the Board of Industries in supplying this information regarding the obtaining of materials, the marketing of products in India, and dealing with Indian firms?—*A.* Yes.

Q. So that the English directors would derive some instruction from the Indian directors, while the Indian directors will derive some knowledge from the English directors?—*A.* They will supply local knowledge of material, labour and market, and the English directors will supply more technical knowledge of the industries with which they are financed.

Q. So that it will be a school for both?—*A.* Well, if it is to be called a school.

Q. Don't fight shy of the word "school"; the whole world is a school; we, Members of the Commission, are at school. Your whole point is that, as you have quoted the remarks of Sir William Clark, if the desire is to build up industries, the capital, control and management should be in the hands of Indians. You want all new enterprises to be assisted and so modelled—so far as Government can do so—that Indian capital and Indian talent will be employed in developing the industries of India?—*A.* That is my main object.

Q. European trade and industry has not suffered from want of support from Government nor do they stand in need of such support from Government. It was in response to Indian trade that this Commission was appointed, so that your whole argument is that whatever aid is needed by Indians, should be secured by obtaining the co-operation of-

Indians with Englishmen, so far as the Government can?—*A*. Yes, and to quote Sir William Clark again, he asked the Council if "it merely meant that the manufacturer who now competes with you from a distance would transfer his activities to India and compete with you within your own boundaries." His object was to keep that out.

Q. You want to provide against that; you want to provide against foreign people coming and taking away business enterprises?—*A*. If they give us experience, I don't mind.

Q. You want to trade with them on the terms that are favourable to India? -*A*. Yes.

WITNESS NO. 234.

SIR W. B. HUNTER, *Secretary and Treasurer, Bank of Madras*.

WRITTEN EVIDENCE.

I have the honour to submit a statement of the evidence I am prepared to give before the Commission. It is observed that the Government of Madras nominated me as a witness having special knowledge of financing of industries and I propose to confine my remarks almost entirely to finance and especially to the financing of industries in this Presidency.

Financing of industries.

It is a popular cry, if not belief, that industries are strangled in India for want of reasonable financial facilities. I can, without hesitation, say that in this Presidency the complaint is without solid foundation. It is true that large tracts of country still lack banking facilities but in all the more important centres of this Presidency a branch bank is to be found (vide Appendix I) and I can say that no reasonable business proposition for financing an industry put before the Presidency Bank is turned down. I must make it quite clear that by financing an industry, I do not mean the finding of the initial capital required for the bricks, mortar and machinery, but the working capital required to finance the stocks. The business a Presidency Bank may undertake is strictly confined within certain limits laid down in the Banks Act, and the underwriting of industrial capital and investing in, or lending on the security of, shares in industrial concerns do not, rightly or wrongly, come within those limits.

Madras is of course mainly agricultural, but of recent years industrial development has been marked, and whereas twenty years ago the industrial concerns we were financing were few and far between, we have now in our books among others:—

	Amount borrowed from bank in busy season. RS.
9 Cotton spinning and (or) weaving mills. 3 Jute mills. 3 Sugar factories. 3 Large coir mat and matting mills.	 96,64,000
101 Rice mills. 25 Cotton ginning mills and presses. 19 Oil mills. 2 Small coir matting mills. 1 Tannery. 2 Silk mills. 3 Saw mills. 5 Tile works. 3 Coffee works. 1 Salt factory. 2 Tobacco factories. 2 Distilleries. 1 Manure works. 1 Electrical works. 1 Motor transport.	 98,42,000

In the busy season we have out in advances to those concerns at one time anything between Rs. 175 and Rs. 200 lakhs. Of this Rs. 110 lakhs are to Indian concerns and Rs. 80 lakhs to European.

As an indication of how the industrial movement is gaining ground in this Presidency, and how the bank fosters the movement, I enclose a note (Appendix II) written by Mr. W. R. T. Mackay, the Bank's Inspector of branches on the rice mill industry in the delta districts of Kistna and Gödävari.

It is probably true that small cottage industries especially in places far removed from the operation of a branch bank are hampered by want of finance or ground down by the usurious rates of the village money-lender, and for this the remedy would appear to be the development of industrial co-operation.

Capital.

The raising of capital for large industrial enterprise is quite another matter and speaking for this Presidency alone, I can say a very difficult one. A well-managed going concern that has been paying steady dividends might probably raise the necessary capital for extension without much difficulty from among its own shareholders and managing agents, but a new enterprise on a large scale would have little chance of filling up its lists by general subscriptions from an investing public, and unless the promoters and their friends were in a position and willing to take the risk of putting up nearly the whole capital, the proposal would almost certainly fall through. In my opinion Government assistance in some form or other, together with the establishment of Government pioneer and demonstration factories, is very desirable.

Government assistance.

In question 5 opinions are asked on various methods of Government aid and in question 6 on the form of Government control, if any, which should be applied.

I am strongly of opinion that it is better not to put any restriction on the manner in which Government assistance may be given—a grant-in-aid may be the most suitable form for one industry, whereas a subsidy or bounty may be more useful for another, or even a combination of three or more forms of assistance may be desirable. Each case should be dealt with according to its merits and requirements, the wishes of the promoters being duly considered. Anything in the nature of "these are the rules you may take it or leave" should be avoided.

With regard to control also no hard and fast rule can be laid down; each case must be dealt with according to circumstances. In my opinion, however, it is essential that Government should have the right of full control of any concern or industry which receives Government assistance, though it does not necessarily follow the right will be exercised even in part.

Pioneer factories.

In my opinion it is very desirable that in this Presidency Government should pioneer industries and establish demonstration factories, but if I may say so without in any way detracting from what has already been done here in this respect, I think the time has come when all energies and funds available should be turned on to really big things allowing in the meantime small things to be promoted by private enterprise. One factory does not make an industry. There are possibilities and they should be tackled boldly. We have the raw material in cotton the quality of which with the assistance of the Agricultural Department is improving, and could be very much improved, and the market for the finished article in fine cloths is at our door. We have groundnuts and products of the coconut tree, and important industries from these might reasonably be expected, if taken up with determination, and above all there should be no limit of any kind whatever to the aid which may be given to enterprises because it competes with an established external trade.

The stage at which a pioneer factory should be closed or handed over to private capitalists or companies cannot be governed by any general rule. The failures may be handed over when every hope of success has been given up if any one is foolish enough to buy them, but not so the successes or promising ventures. They may at any stage be turned into companies, and handed over to business houses to manage and develop, but the share capital or the major portion of it should be retained together with the power of full control. The chief aim to be kept in view is, of course, the development of the industry and not the making of profits, at the same time it is only reasonable that when it can be done without detriment to the chief aim the profits should be made so far as possible to counterbalance the losses. On the other hand, if a pioneer factory as soon as success is more or less assured, is handed over to a private company not only are profits lost, but there will be a risk of the establishment of a kind of monopoly, whereas if Government keep full control of the parent concern, they will be able to encourage development not only by giving financial aid, but by supplying trained workers and managers with all the experience of the initial difficulties behind them. It is by building upon such foundation, I see the possibility of creating a big financial corporation for financing the capital requirements for promoting new industries and developing existing ones. The creation of a big financial bank with large capital to finance new industries is in my opinion beginning at the wrong end and is fraught with every possible danger and pitfall. In addition to this the creation of such an institution together with apex banks for co-operative credit societies must in my opinion be held in abeyance until such time as the formation or not of a State or central bank is definitely settled.

The formation of a State Bank would relieve one of the principal obstructions to development, viz., the inelasticity of the currency and with the removal of that, apex banks and industrial banks could be more easily developed, probably in the earlier stages as departments of the central bank.

APPENDIX I.

Branch.	Sub-Branch.	Outstations.	District.
Alleppey	..	..	Travancore State
Bangalore	..	..	Bangalore.
Bimilipatam	..	..	Vizagapatam.
	Vizianagram	.	,,
	..	Vizagapatam	,,
Calicut	..	..	Malabar.
Cocanada	..	..	Gōdāvari.
	Rajahmundry	..	,,
	Narasapur	..	Kistna
	..	Samalkota	Gōdavāri.
	.	Ellore	Kistna
	..	Gondugollu	,,
	..	Kaikaram	,,
	..	Paloole	,,
	..	Maruteru	,,
Cochin	..	..	South Malabar.
Coimbatore	..	..	Coimbatore.
	Erode	..	,,
	.	Pollachi	,,
	..	Tirupur	,,
	..	Nedupalayam	,,
Guntūr	..	..	Guntūr.
	Bezwada	..	Kistna.
	..	Tenali	Guntūr.
	..	Repalli	,,
	..	Nellore	Nellore.
Madura	..	..	Madura.
Mangalore	..	..	Canara.
Masulipatam	..	..	Kistna.
	..	Gudivada	,,
Negapatam	..	..	Tanjore.
Ootacamund	..	..	Nilgiris.
Salem	..	..	Salem.
Tellicherry	..	..	Malabar
Trichinopoly	..	..	Trichinopoly.
	..	Tanjore	Tanjore.
Trivandrum	..	..	Travancore State.
	..	Nagercoil	,,
Tuticorin	..	..	Tinnevelly.

APPENDIX II.

Note on rice mills in the Guntūr district.

The development of the rice mill industry in the Guntūr district is due to—

(1) the enterprise of the people and their mutual trust in each other which brought into existence capital raised by co-operation, and

(2) the financial facilities offered by the Bank of Madras.

The usual method of raising capital to start a rice mill is as follows:—

A number of men, say 12, join together in the venture and assuming that the mill is estimated to cost Rs. 60,000, they decide to take up between them 60 shares of Rs. 1,000. Each man may take up five shares or it may be that some take up more and others less. From among themselves they appoint two managers who take up larger holdings than the others as a rule but not always for in some cases the managers are quite small holders but during their term of management they are required to increase their interest in the mills by special deposit, usually Rs. 5,000 which is used as additional capital and carries interest.

2. To provide for working capital a further call is made of say Rs. 200 or Rs. 400 per share. The working capital in itself is not sufficient for the mill's requirements and

the bank is resorted to for financial assistance. This assistance is given in two ways. (*a*) "Clean Loans," (*b*) "Produce Loans." Clean loans are granted on pronotes signed by the two men who have been appointed managers supported by a personal guarantee by those who have taken shares in the mill venture, that is to say, the twelve men jointly and severally guarantee the bank against any loss arising out of money advanced on account of the mill. On the strength of this guarantee the bank is enabled to provide the additional capital required to cover stocks in process of being purchased, milled or marketed.

3. When paddy comes freely to the market and when it suits the mill to do so "Produce Loans" are resorted to. Paddy beyond immediate requirements is purchased, stored in godowns under the bank's lock and key and the bank advances against it. The paddy remains under lien until such time as arrivals at the market are not sufficient to meet the mill's requirements.

4. In addition to advancing moneys to the mills in the manner described, advances are frequently granted by the bank to individuals in order to enable them to take up shares in the mills. The mills with few exceptions are not registered under the Indian Companies Act but generally all the parties embarking on the venture execute an agreement. From time to time meetings are held and a record of proceedings maintained.

5. There have been disputes among shareholders which have brought about the temporary closing of mills but considering the conservative nature of the people and taking into account the difficulties which always have to be overcome when new methods and customs are introduced, it is a matter for satisfaction that the ryots and merchants who joined together have by co-operation aided by sympathetic financial assistance been able to firmly establish an important and successful industry in the district.

6. At the beginning of the movement many difficulties had to be contended with and while from the point of view of security the bank's position was sound, it was found necessary in the interests of the industry to exercise a very close supervision and control over each mill. The bank's agent frequently visited these mills, inspected the machinery, the quality of the output and the stocks not under lien; examined the mill books and frequently advised at the beginning as to how the books should be written up and accounts prepared. Millers were also advised as to markets and were brought into touch with buyers through the bank's agent at the consuming centres. The tendency to sell rice to too great an extent on credit had to be checked and the necessity of collecting sale-proceeds within reasonable time insisted on. Many suggestions have been made in the direction of getting the mills to employ representatives to travel and bring the mill products before possible buyers but the advice is not acted upon. The Telugu is much less inclined to travel than the Tamil and in view of this it was suggested that a Tamil representative might be engaged by a combination of mills to visit southern places in their joint interest, but the suggestion has never been acted upon and the opposing interests of the individual mills are against it. It may however be mentioned that at the present moment, at the instance of the Alleppey agent, mill managers in the Guntūr and Tenali districts are being placed in touch with a firm of the west coast who are prospective buyers of cooly rice for the tea and rubber estates under their agency. As mills increased improvements in structure from an insurance point of view were suggested and carried out and generally speaking the bank's agent had to take much the same interest in these mills as if he himself were part owner or joint manager. In one case on visiting a mill it was found that the structure showed signs of weakness, the play and vibration of the machinery was shaking the building. Expert opinion was advised and insisted on with the result that at a comparatively small cost the building was made secure and stable and a serious disaster avoided.

7. The history of one mill may be of interest. At a certain village a considerable business was done in selling brown or rough rice to the mills. The paddy was husked in hand-mill and the rough rice was sold to the mills but when the demand for raw rice gave way to the greater demand for boiled rice the men concerned found that what they had regarded as a sure business was disappearing. They consulted together with the result that a number of small metal boilers were purchased and placed in various backyards where small drying platforms were also laid down. The paddy was boiled, dried on the platforms, put through the hand-mills and the rough rice sold to the mills. Some time after this they had a further consultation which resulted in their combining together, capital on the lines already described was raised with the bank's assistance and a rice mill erected. This rice mill which is successfully working is managed by two of the villagers and is financed by the bank.

8. Prior to the year 1906 there were only a few rice mills in the Gōdāvari, Guntūr and Kistna districts. The number has since increased very largely and during this year (1916) the bank has financed in these districts as many as 74 rice mills in addition to which there are others, though I believe not many, who have not come to us for assistance.

9. Capital for cotton ginning factories is raised in the same manner and these factories are financed by the bank on the same lines as the rice mills.

10. The following figures showing our advances outstanding in the Guntūr, Gōdāvari and Kistna districts in May 1906 and our deposits (other than Government) on the

same date compared with our present investments and deposits in these districts may be interesting as showing that banking development in the districts in this Presidency is at present almost entirely one sided:—

	Lakhs. Rs.
Total advances on 31st May 1906	22
Do. do. 1916	131
Increase	109
Total deposits (other than Government deposits on 31st May 1906	14
Total deposits (other than Government deposits on 31st May 1916	26
Increase	12

ORAL EVIDENCE, 29TH JANUARY 1917.

Sir F. H. Stewart.—*Q.* How long have you been Secretary and Treasurer of the Bank of Madras?—*A.* Eleven years.

Q. Before that, you were a number of years in the bank's service?—*A.* Total service now over 28 years. I have held various appointments including that of inspector of agencies.

Q. And you have therefore an intimate personal knowledge of the bank's work?—*A.* Yes.

Q. You are in favour of Government assistance for the development of industries?—*A.* Yes.

Q. Financially and by means of the establishment of pioneer and demonstration factories?—*A.* Yes.

Q. How could that financial assistance be best given? Could it be conveniently and usefully given through the Presidency banks?—*A.* The Presidency banks would, no doubt, finance the stocks, but the Government financial assistance required is more in the shape of share capital or perhaps debentures. The Presidency banks could not do that under the Act.

Q. And also it is not exactly banking business?—*A.* Yes. So far as this Presidency is concerned, there has not been any trouble about financing the working capital of industries.

Q. You do not see any particular need for modification of the Presidency Banks Act?—*A.* Not with that end in view.

Q. You divide industries into smaller and larger industries and you think that the smaller and cottage industries can be dealt with by means of private enterprise and co-operation and that every available assistance should be given to them by the Department of Industries?—*A.* That is my idea. I should like the Department of Industries to take up some really big thing to pioneer.

Q. You would put on the bigger things to the Department of Industries?—*A.* Yes.

Q. You say, "the creation of a big financial bank with large capital to finance new industries is, in my opinion beginning at the wrong end", but you indicate that a big financial corporation might do better. Would that be a private corporation?—*A.* My idea was that it could come by the Government pioneering big industries. They will hold the bulk of the share capital to start with and then they will hand over the factory when it has developed and proved itself to be successful and then let go a certain amount of shares still holding control of the concern. Then they would start another factory and hand it over still holding a sufficient number of shares to ensure control. These Government shares would eventually be the foundation of the financial corporation.

Q. And you would suggest the Government disposing of the factories one by one and not handing them in a body to certain houses: That would tend to establish a monopoly?—*A.* Yes.

Q. You will have to be careful to avoid that?—*A.* Yes. You can hand over the management without the absolute control. You can let the business house working it have a certain proportion of the shares.

Q. How do you think that the Department of Industries should be constituted? Should there be a Board as well?—*A.* I think that an Advisory Board would be a good thing.

Q. Standing or permanent?—*A.* You may have one or two permanent members with power to add to their number for every particular industry you want to take up or inquire into.

Q. Would it have budgetted funds—this Department of Industries or would it have to go to the Government as the occasion arises?—*A.* It would be well to have a certain amount budgetted for general expenses but power to exceed budget when required should be freely given when possible.

Q. It would be provincial in each case? It would not be imperial?—*A.* Each province would be well to have its own.

Q. With a Imperial Director-General of Industries perhaps?—*A.* Yes.

Q. You refer to the very large sums you have given out in advances to the different concerns during the busy season. I suppose that money is handled in specie practically entirely?—*A.* You refer to industries proper or to trade in general.

Q. I suppose to finance the various crops?—*A.* No, it is not all in silver. In some districts in the Presidency notes are received and used freely.

Q. Is there complete willingness to take notes?—*A.* I think so in some districts though not in all.

Q. With reference to your remark in the last paragraph of your note with regard to State bank, one of the functions of the State bank, I suppose, would be to take up the paper currency?—*A.* Yes, and develop a certain amount of paper money.

Q. But might not that have a retarding effect? The Government notes are gradually becoming, it would appear, more popular among the people and if you wish to make any change, it might be apt to have a retarding effect?—*A.* Because I think you might hand the paper currency over to be worked by the State bank, it would not necessarily follow that Government guarantee is to be withdrawn.

Q. You would agree that any attempt to force the popularising of Government currency notes would defeat its own ends? It must come gradually?—*A.* Yes. But the opening of new branches in all the outlying districts that have not got any banking facilities would, in itself, spread the use of currency notes.

Q. Can you give any idea as to what proportion of the capital that is used in financing the movements of crops is non-Europeans in this Presidency?—*A.* I am afraid I could not give you any estimate of that.

Q. A very large proportion in the earlier stages?—*A.* Of course a great many crops the European never touches at all. One of the very largest is rice. The rice crop in this Presidency, so far as I know, is not touched by a single European. Cotton to a certain extent is in the hands of Indians and a large proportion of it is financed from Bombay.

Q. You do grant loans very freely indeed on agricultural produce?—*A.* Yes.

Q. Under necessary safeguards?—*A.* Yes.

Q. And act through your agents?—*A.* Yes. We do not grant loans against produce in Madras to any large extent. There is very little demand for such accommodation except from the small dealers whose transactions it would be too difficult to follow. These small men are financed by the shroffs and native bankers down here, that is, *Nattukkottai Chettis,* and we finance the *Nattukkottai Chettis* to a large extent. On the other hand a large portion of the business at the branches of the bank is in the form of loans against produce.

Q. A witness told us the other day with reference to the Berhampur district—I do not think he stated it as a fact—but he said that he believed that the bank discontinued lately the granting of loans on produce and that there has been a dislocation of trade there. Is that so?—*A.* It is true we recently closed down all business in Berhampur Originally we had a branch at Berhampur and we closed that down about 15 years ago. It did not pay. We closed shortly after the railway had been built there, and trade was drawn away from Berhampur to other centres. A few years ago we attempted to work Berhampur as an outagency from Vizianagram, which is a very long way off and we gave it a trial in more ways than one, but there was practically no business going on there. There was no mercantile firm there to whom we could entrust the business and so we closed it down. As a matter of fact, it meant a question of under Rs. 50,000 to finance all the business offering there, and there was no dislocation of trade by our branch being closed down.

Q. Has the Bank of Madras as such taken any interest or done anything to help the co-operative movement in this Presidency?—*A.* We have not taken any active part in the starting of individual societies, but we have been very sympathetic towards the movement. The present position is this. The Madras central urban bank which is more or less an apex bank in this Presidency has a cash credit account from us to the maximum allowed under our by -laws.

Q. On what security?—*A.* The security of the pronotes of the rural societies to whom it advances.

Q. Is that quite in order under the Banks Act?—*A.* Yes. The pronotes are payable on demand. They are notes from the rural societies in favour of the urban bank and we hold them as security for the cash credit. In addition to that, some years ago the Registrar asked us if we could not do something more to help the district co-operative banks that finance the smaller rural societies and we said that we would be very glad to consider any definite proposition that he put up, and so far we have never turned down any business that he has recommended. At present the Coimbatore District Urban Bank, Trichinopoly District Bank, Salem District Bank, Madura, Rāmnād, Tanjore and Kistna Banks have cash credits with us.

Mr. C. E. Low.—*Q.* When your bank advances money to industrial concerns, to what extent does the bank go into the affairs of the industry and the way it is conducted?—*A.* If it is a large concern, such as the Buckingham Mills and the Carnatic Mills, we have their balance sheets, and we know their position and we do not require to enquire very closely into their affairs. With regard to small concerns that are not joint stock companies but are privately owned, such as our rice mills and things like that, we know the people who are running them and make further enquiries as to their means and integrity and accordingly we make our advances or refuse them.

Q. You go more on the character of the persons who are responsible for the concern than the concern itself?—*A.* We have got to take very largely into consideration their business qualifications their ability and integrity.

Q. But you do not inspect their books and that sort of thing by an officer of the bank?—*A.* We have done so.

Q. It would be exceptional?—*A.* It is not our general rule. With regard to the rice mills, our agents in certain districts have largely assisted them in their book-keeping and the ways of conducting their business. So far as their stocks are concerned we examine their books and we get returns of the stocks they hold, what their sales have been, etc.

Q. You say, "The creation of a big financial bank with large capital to finance new industries is in my opinion beginning at the wrong end and is fraught with every possible danger and pitfall." When you say new industries, would not the industrial bank to a very large extent also finance the extension of an existing industry?—*A.* Certainly it will do that. I am confining myself to this Presidency. I am not speaking for the other Presidencies where industries are so much further advanced than here.

Q. As a rule, a very large proportion of the business of the industrial bank, in the first instance, would be the extension of existing industries as compared with new industries?—*A.* Yes. But if you start a financial corporation with a very large capital, you have immediately got to build a number of mills and the probability is that a good many industries will find development in being over-done.

Q. I asked you what you thought the danger would particularly be? It would have to be a big bank, or else it could not undertake that kind of business at all?—*A.* It would have to be so.

Q. Because it will have to distribute its risks?—*A.* Yes.

Q. Do you think that it is likely that in this Presidency you will be able to distribute your risks sufficiently?—*A.* Not at present. But there are certain possibilities if begun quietly and gradually worked out.

Q. I notice in the list of industries which you say your bank has been concerned in financing, you mention only one tannery?—*A.* Yes.

Q. In view of the large number of tanneries, some of them of importance, which exist in this Presidency, it is very curious?—*A.* As a matter of fact, tanning industry is one that the bank has always fought very shy of. It is rather a speculative business and to a large extent the tanners are already fully financed by the big firms.

Q. You do not finance them directly, but they are financed by the exporters whom you finance in turn?—*A.* Yes. As a matter of fact, exchange banks really finance a greater portion of that. It is export business and it goes to them naturally.

Q. You prefer to allow the financing of these tanneries to be conducted through some firm that has made relations with them?—*A.* And eliminate the danger of the same stock being financed twice over.

Q. Supposing it is a question of Government financial assistance by a loan, do you think that the loan should be given by Government or preferably by the Industrial bank?—*A.* By the industrial bank. That is what the industrial bank is intended for.

Q. Apart from the fact that Government will be doing the industrial bank's business the industrial bank will bring more reason to bear on the thing than the Government?—*A.* Yes. The bank would be more in touch with the business.

Q. Do you think there would be a large business for the industrial bank to do for a number of years?—*A.* Not in this Presidency.

Q. You think that there is a case for the Government retention of management of pioneer factory in order to supply trained workers and managers?—*A.* Yes. That is one of the important reasons for Government having the control.

Q. How are you going to prevent a pioneer factory with Government money behind it from competing in an unfair way with the existing concerns that are started thereafter? I do not say that it is at all impossible, but what would be your suggestion for preventing it?—*A.* I should think the natural extension of the industry would be through Government subsidiary companies.

Q. That might considerably increase the Government's liabilities for proper management which would not be desirable?—*A*. Yes. I did not consider that, but I do not consider it a matter of great importance. Though Government has power of control they would not necessarily exercise the power.

Mr. A. Chatterton.—*Q*. Would you suggest territorial distribution of activity in that case?—*A*. When subsidiary or independent concerns are started, they might arrange with the original concern that they should not compete in certain areas.

Mr. C. E. Low.—*Q*. Or they might sell their output through a common agency?—*A*. They could sell their output through a common agency. I think that the evils of competition between a new concern and one that had been pioneered by Government can be exaggerated because they cannot both be working under identical conditions. It is quite possible that the private concern would be working under more favourable conditions.

Sir F. H. Stewart.—*Q*. The object of the Government institution will be partly educational?—*A*. Yes.

Hon'ble Pandit M. M. Malaviya.—*Q*. You say, "It is a popular cry, if not belief, that industries are strangled in India for want of reasonable financial facilities. I can, without hesitation, say that in this Presidency the complaint is without solid foundation." You refer there to agricultural industries mainly?—*A*. No.

Q. You refer to manufacturing industries also?—*A*. Yes.

Q. How many weaving mills are you financing here? You say "nine cotton spinning and (or) weaving mills"?—*A*. There are nine altogether. Three of them are spinning only five are spinning and weaving and one weaving only.

Q. Are these owned by European firms?—*A*. Some of them are.

Q. Which of these?—*A*. It is not quite correct to say European owned—we will say, European managed. Most of them have a good many Indian shareholders as well. There are the Buckingham Mills, the Carnatic Mills and the Bangalore Woollen and Cotton Mills which are managed by Messrs. Binny & Co. The Coimbatore Mill is managed by Messrs. Stanes & Co., but a good deal of the capital is Indian capital. In Mysore, the Spinning and Weaving Mills are managed by Indians with Indian capital. Mall mill is entirely Indian capital, but it has been handed over to the management of Messrs. Stanes & Co., because Indian management was not successful. Kaleswaram mill is entirely Indian capital and Indian managed. It is managed by a big *Nattukkottai Chetti*. Koilpatti Mills are owned and worked by Indians.

Q. In what way do you finance—on the security of stocks?—*A*. It really comes to security of their stocks. To a certain extent we work in this way. We take a pro-note jointly by the managing agents and the company for a certain amount, say for five lakhs or six lakhs, or whatever it may be, and they undertake to hold all the stocks or the equivalent against it and we get a monthly statement of the stocks on hand.

Q. Are the three jute mills mentioned in your written statement Indian or European?—*A*. They are all Indian. The biggest jute mill is part of the South Indian Industrials. It used to be the old Arbuthnot Industrials, but it was bought over by the Hajis and it is worked by them.

Q. You say that these industries have not found any difficulty in obtaining financial help. Have you had any proposition before you for capital for starting industries?—*A*. No. I do not think we have had any special application except in cases of the small rice mills. They put up a certain amount of cash and we give an advance on the personal security of those interested to build godowns. We help them as far as we can within safe limits without tying up an undue amount in brick and mortar and machinery. That we cannot do.

Q. Do these rice mills generally prepare rice for export—that is, the 101 rice mills that you speak of?—*A*. Not entirely for foreign export. There is very little that goes to Europe.

Q. There is not very much foreign export trade in Madras in rice?—*A*. There are two places that a certain amount goes to, Ceylon and Mauritius; very little goes to Europe.

Q. To Sumatra?—*A*. Not very much from this Presidency. They used to get rice from Rangoon and Siam.

Q. In Madras it is mostly boiled rice?—*A*. To a very large extent, it is boiled rice.

Q. I have heard it stated that your branches are only in places where there is a brisk export or import trade. Is that so? How far is that statement correct?—*A*. It could not be further away from the truth. It is not so. The amount that we finance for foreign export is very very small comparatively speaking. It so happens that we have got a great many of our branches in sea-port towns, but you have got to go back to the dates when those branches were first started—in those days there were no communications but by sea.

Q. And they have stayed there?—*A.* Yes. The trade has concentrated there and railways have concentrated there. The great difficulty of going inland and opening more branches is the want of resources.

Q. What resources?—*A.* Banking resources.

Q. You have got branches in seven places or nine at present in this Presidency?—*A.* We have nineteen branches and five sub-branches where we have an officer stationed and in addition to these five out-stations where we have an officer stationed permanently, we have a number of small places, some practically in the wilds where there is no means of getting to them excepting by walking over the paddy fields when the canals are closed to traffic. We have an Indian stationed at these places who takes charge of the produce that we grant loans upon.

Q. How many districts do these branches cover?—*A.* There are 24 districts in the Presidency and we have got sixteen branches in fourteen districts. In some districts we have more than one branch, and there are ten districts with no branches. There are six Native States and we have three branches in two Native States. One Native State has two branches, and there are four Native States without branches.

Q. So far as British India in the Madras Presidency is concerned, you have ten branches?—*A.* Ten districts without a branch. Fourteen districts out of 24 have got branches. I can admit that India is under-banked.

Q. The total number of branches that you have is altogether nineteen?—*A.* Yes. One of these branches is not in India but in Colombo.

Q. You yourself feel that these are not sufficient for the financing of industries in this Presidency?—*A.* I have always thought that India is under-banked, and one difficulty is to get resources with which to open more branches. We have got to remember that a bank has two sides. On one side it borrows and on the other side it lends. In new branches my experience is that it is always in one way that banking facilities are wanted, that is, facilities for loans. There is no object in opening branch banks when you have not got money enough to go round. That is the sole reason of the want of development of banking in this Presidency.

Q. You have been helped by Government by very large balances recently. You cannot legitimately complain of want of money? You have had the use of Government balances to a very large extent?—*A.* Not to a very large extent. We have got much less now than 30 or 40 years ago. We have on an average about a crore of rupees and I am very thankful to Government for it, but I should be more thankful if they gave me another two crores, and it could be used to very good purpose in this Presidency.

Q. Have you anything to suggest as to how more capital could be obtained from the people, for instance?—*A.* It is beyond me anyhow to induce the people of India to put their money into banks.

Q. Don't you think that what is needed is that there should be a regular banking organisation, to provide a very much larger number of banks both in the districts and tahsils, for a Presidency like this?—*A.* Everything depends upon funds. *Provided* there was no lack of funds sufficient branch banks would quickly follow.

Q. The population of this Presidency is nearly forty millions?—*A.* Quite possible.

Q. You had, for instance, in England, 7,000 banking offices in 1913. In Ireland you have 863 banking offices and in Scotland 956?—*A.* Yes.

Q. Compared to the facilities which those banks provide for the people of the United Kingdom, you might say that the banking facilities here are extremely poor and unsatisfactory?—*A.* Yes, but there is this difficulty that you seem to overlook. A great proportion of these branches are what we call deposit branches. They simply get deposits.

Q. I want to go to the root of the matter. What do you think led to the development of banking there and what stood in the way of banking here? You have been connected with this bank for 28 years. Has any effort been made by the Government during the last 28 years that you have been connected with this bank to train Indians in banking methods?—*A.* I do not follow the purport of your question. Is it to train the general public to appreciate the value of banks.

Q. No. To train Indians to manage banks, to run banks as managers?—*A.* I do not suppose so.

Q. Nothing has been done?—*A.* I do not suppose so.

Q. Don't you ascribe this want of growth of banking largely to the absence of this kind of education?—*A.* No.

Q. You know that in Japan in the course of 30 or 40 years they have developed banking to a very large extent?—*A.* Yes.

Q. You know that the Government there have taken definite steps to impart and train the Japanese young men in methods of banking?—*A.* Yes.

Q. Don't you think that a similar course, if adopted here, would spread a knowledge of banking business among the people and would create more confidence in banks and induce Indians to invest their money in banks?—*A.* I do not think so. I think you have got to go deeper.

Q. What is it?—*A.* I think to a large extent the trouble is in the Indian law of succession.

Q. In what way?—*A.* You take an undivided Hindu family for instance. A man can make no provision for his wife excepting by the jewellery that he loads on her. A man cannot put money in deposits and industrial concerns to make provision for his wife. She wants naturally some provision left for her especially if there is no son, and there is no particular love for her. You take the Muhammadan law of succession. It is true the ladies of the family are entitled to a certain share, but they have unfortunately the *gosha* system and they depend upon agents outside, and the probability is that in a great many cases they will be swindled by their agents and the consequence is that they want to have their money immediately under their control and the best way to get that is to have actual gold in their possession. That is not peculiar to this country either. I happened to have a conversation with the Financial Adviser to the Egyptian Government and I asked him about the hoarding of gold, and he told me exactly the same thing obtained in Egypt, viz., the Muhammadan ladies' preference for having gold under their possession.

Q. I fear that you are not well informed on that point. Are you aware that a very large number of Hindus living in joint families have been carrying on business for generations. You might say almost cent per cent—I mean among the trading communities?—*A.* The trading community is very very small and I am talking generally. I talk of this Presidency and I restrict my remarks to this Presidency. I do not know what may be going on in Bombay; Bombay is much further advanced than Madras in industries and trades. In Madras our traders practically keep no capital in their trade in cash; their capital is in land and houses and jewellery.

Q. You are aware that investments in banks are a matter of recent growth in all countries? Even in England it has been growing so that if you compare the figures of England 30 years ago with those of the present day, you will find a tremendous difference?—*A.* Yes.

Q. And so also, investments in banks have grown enormously in Japan during the last thirty years and also in other countries?—*A.* Yes.

Q. Has that not been a matter of education in the ways and methods of banking?—*A.* Partly that, but chiefly to natural development due to the increased wealth of the country.

Q. So that it comes to this, that here you can account for this want of development partly owing to the absence of wealth and partly to the absence of a knowledge of the modern methods of banking?—*A.* I won't say that.

Q. Take for instance the savings banks. You find that Indians are largely investing money in the postal savings banks?—*A.* Yes, to some extent.

Q. And they are investing money in co-operative societies?—*A.* To a certain extent.

Q. Is it not due to the fact that savings banks have been instituted and co-operative banks have been instituted?—*A.* Undoubtedly. If they had not been instituted they could not put money into them.

Q. If they were not in existence where could they put money? You think that short of the demolition of the joint family system and short of a change in the *purda* system among the Muhammadans, there is no step which you can recommend to Government to promote greater investments in banks?—*A.* I do not think that anything that you could do will induce a greater investment in banking excepting natural development. As I have said before, India is under-banked, and if I had the power and resources I would have banks opened everywhere. But everywhere we go, it is a case of wanting to borrow from the bank and not paying money in, and the development of a number of branches must necessarily be slow.

Dr. E. Hopkinson.—*Q.* In cases where you have opened branches in the mufassil do you find that there is a great development in the number of depositors?—*A.* No, the development is very slow.

Q. It is so slow as to discourage you from extending the number of branches?—*A.* I would not say discourage. As long as we have got resources elsewhere in big centres we will go in spite of the fact that it is very slow development. It is so slow that it has not enabled us to open as quickly as we would otherwise have done.

Q. What do you mean by saying that India is underbanked? Is it that there is not a sufficient number of branches for the size of the country?—*A.* Yes.

Q. And you cannot suggest any means by which that particular difficulty can be got over?—*A.* To my mind the formation of a big State bank with the paper currency would help very largely. It is not the question whether a branch pays or not, that prevents the increase of branches. I am quite prepared to open branches at many places that I know will not pay for many years to come. I know eventually they will be made to pay, but I have not got the resources to open.

Q. Your bank needs assistance to enable it to carry out that particular form of development?—*A.* Yes.

Hon'ble Pandit M. M. Malaviya.—*Q*. When was the Indian Bank started?—*A*. 1907.

Q. And it was started on the failure of Messrs. Arbuthnot & Co.?—*A*. Shortly after that.

Q. Are you aware that a lot of money was invested in Messrs. Arbuthnot & Co.?—*A*. Yes.

Q. Nearly a crore of rupees?—*A*. I should think probably that there was fully two crore of rupees.

Q. It was nearly all or mostly Indian money?—*A*. No. A crore of rupees was Indian money. The total amount of deposits in that firm was over two crores and I should think that over half was Indian money, but I do not know the details.

Q. About crore of money was Indian money?—*A*. Yes.

Q. And it came from the Madras Presidency?—*A*. Yes.

Q. You are aware also that the Indian Bank has attracted mostly Indian capital?—*A*. Yes.

Q. And it has now got a working capital of nearly fifty lakhs?—*A*. About 50 lakhs.

Q. Is not that clear evidence that Indians are willing to invest money in banks?—*A*. I do not think that 50 lakhs is a very big sum for a big Presidency like this.

Q. Do you think that without the enormous help which the Presidency bank has been receiving from the Government it would have done better than the Indian bank has done during the last nine years?—*A*. I have nothing to say against the Indian bank. I have no doubt that the Indian Bank is doing most excellent work and I have no desire for it otherwise than that it should prosper.

(*At this point the Commission adjourned and resumed after an interval.*)

Q. You are aware that a good deal has been said about Indians not being appointed as directors of the Presidency banks, and I find in your evidence before the Royal Commission that you expressed yourself in favour of the appointment of Indian directors. Am I right in that view?—*A*. I do not remember having expressed that view, of being in favour of an Indian director. I do not think I was asked the question. I was simply asked whether there were any Indian directors, and I said no, and that, so far as I could remember, there had never been any occasion when an Indian director had been proposed.

Q. You were asked why no Indian directors had been appointed by the bank and you said that a large proportion of the shares of the Bank of Madras were held by Europeans and no Indian directors were appointed by the shareholders and you did not think that there had been within your recollection an Indian director proposed. Since that evidence was given I understand that a gentleman was proposed and that he was defeated. Is that so?—*A*. It is a fact that on one occasion there was an Indian proposed but he was not eligible and then they proposed some one else and he was not elected.

Q. Don't you think that it would be an advantage to have some Indians as directors of the bank? What is your personal view?—*A*. My personal view is that it is not a racial question at all. We want on the directorate of the bank the best men that we can get hold of.

Q. The bank has been in existence since 1876 under the present Act?—*A*. Yes.

Q. Is it not strange that you have never found one single Indian gentleman, apart from any racial consideration, whom you could elect as a director?—*A*. I do not think there is anything very extraordinary about that. After all, you take Madras itself. You find that all the large industrial affairs are run by Europeans and all the big traders are Europeans.

Q. Are not many of these European traders and merchants men of less substance individually than a number of Indian merchants in Madras?—*A*. I take the firm that they represent.

Q. The man is elected as a director for his personal qualifications?—*A*. Yes. For his personal qualifications and not for his wealth.

Q. And not in connection with the firm merely?—*A*. He is elected for his personal qualifications, but the question that you asked me just now was whether there were not many Indians of greater wealth than the individual partners of the firm?

Q. Yes.—*A*. That may be so, I could admit that.

Q. And many of these Indian merchants are carrying on business in their own way on a large scale?—*A*. That I am not prepared to admit. I say that there are practically no large Indian merchants in Madras.

Q. What is your idea of a large Indian merchant? In order to shorten the point have you got in Madras Indian merchants of the same standing, so far as position and business experience goes, as several of the individual partners of the European firms judging them from the number of shares they hold in the concerns?—*A*. That is individual wealth. I am talking of business. As business you must take firm against firm. As against individual capacity for being a director, you must take an individual man against an individual man and it is not a question of wealth. So long as he has got sufficient wealth to obtain the qualifying number of shares and he has got the ability, he is eligible and we select him.

Q. You do not think that there have been many Indian merchants during these forty years in Madras who could be elected as directors of the Board?—*A*. I do not know one that has got the qualifications necessary for a directorship.

Q. Nor an Indian lawyer?—*A*. I do not see that we want a lawyer.

Q. You have two lawyers?—*A*. We have our own solicitors.

Q. You have never felt the need to get an Indian,—even though an Indian lawyer—as a director of the bank?—*A*. The point is this I have no right to select him. It is for the shareholders to select him and it is entirely a proposition for the shareholders to say whom they want as directors. The bank is a self-governing institution and it is the right of the shareholders to elect those whom they think best fitted. I have nothing to do with the election of directors. If there is an Indian qualified in every respect and they select him I should be most glad.

Q. You suggest here that if a big bank were established it might not find business enough for some time to come. Don't you think in view of the possibilities of industrial development in various directions, any bank like that which is started should, in the course of a few years, find enough business to go on with?—*A*. I see very great difficulties in the organisation of the bank. To start with, you must have a very very expensive staff of experts to enquire into all the possibilities of new industries, and if you start to collect a big capital, the first difficulty you have got to encounter is the difficulty of getting capital for this particular purpose. I see no reason why it should be easier to get capital for a bank that is going to finance industries than it is to get capital to start the industries direct.

Q. Leaving the question of starting industry itself and confining ourselves to the question of the bank, there are three things on the security of which a bank like that might make loans, namely, stocks, machinery and buildings?—*A*. Yes. But I do not think that you would advocate that a bank under ordinary banking conditions should grant advances in those ways. It is a financial corporation.

Q. I am confining myself to the industrial bank that will be started with the object of helping industries. There are three things on the security of which the bank might make loans, viz., stocks, machinery and buildings?—*A*. Yes.

Q. Your present Presidency bank does lend money on the security of stocks?—*A*. Yes.

Q. You do not find any difficulty in deciding what money you should lend on that security?—*A*. No.

Q. Then the only security which the new bank will have to deal with will be machinery and buildings?—*A*. Yes.

Q. Is there any difficulty in having an estimate made of the value of buildings in the city?—*A*. Yes, there is.

Q. Are there not engineers who can tell you what a building should be valued at?—*A*. A building is valuable according to the purpose for which it can be put to. If you have a building erected as a cotton mill and the cotton mill fails and is not successful or is not likely to be successful, that building would be worth nothing, unless it can be turned into something else.

Q. Suppose you want to judge as to what loan you should make, and as to what capital has been invested in the building and machinery,—assuming that you want to lend money on that security—would you have any serious difficulty in finding that out?—*A*. No. There is no difficulty in finding what the building would cost, or what the machinery would cost.

Q. If an industrial bank confines its business to lending money on those securities why should there be any great need of having a large number of experts on the staff to advise it?—*A*. Because I conclude that you are going to advance against something more than what the industries cost to erect and establish. Unless you have some certainty that it is going to be a success, you are not going to advance money.

Q. Would not the bank judge of all the possibilities before deciding it?—*A*. I do not think that the ordinary banker is qualified. He is not a technical expert in every conceivable trade or industry.

Q. He will be able to judge of the value of stocks?—*A*. He will judge of their market value.

Q. He will be able to get advice as to value of machinery and buildings?—*A*. Yes.

Q. On these three securities would it not be possible to come to a conclusion whether he should or should not advance a certain amount of loan, the amount of loan being in his discretion?—*A*. I do not think that it is possible unless one knows whether the industry is going to be successfully worked, because I understand your idea is an initial advance to enable the industry to be started. You are not asking whether in the case of an industry that has already proved itself to be successful and to be able to work profitably it would be thought advisable to grant a further advance. That is a different proposition.

Q. I am asking you about the case of an industry which has secured some capital and has invested that capital in building and plant and which wants to obtain money in order to go on with the business?—*A.* The business is already running?

Q. The business has been started?—*A.* And proved itself to be profitable?

Q. May be profitable or not profitable. I wish to know whether the bank could lend money not only on the security of stocks but also on the security of building and machinery?—*A.* A great deal would depend on what the results of that running had been up-to-date. It would not be sound banking business for a bank in the ordinary sense to advance against building and plant. If you have an industrial corporation which raises money chiefly by capital and by long term debentures or inconvertible debentures—debentures the holders whereof can only recover the money when they find some one else to take them up by selling them or by passing them from hand to hand—then the proposition might be considered. If a bank is started and you have nothing to finance you force the pace.

Q. Is it not a matter of the required amount of capital that you would take in the beginning?—*A.* Yes.

Q. And there would not be any practical difficulty on that score? You will not be flooded with more money than you want and you will take in as much as you will be able to utilise?—*A.* You must have a big capital and a big business to start a bank of this description, if it is to be of any use, because you have a very large and expensive establishment, and to my mind it is a point whether Government will be justified in providing this staff to begin with.

Q. Suppose Government did not provide a pice of the money for this bank and it simply guaranteed 5 per cent interest for ten years. Suppose that Government did that much only would you have any objection to that bank being started with that Government guarantee?—*A.* I have no objection to a bank being started.

Q. Do you think that capital will come in with that encouragement?—*A.* It will depend on the rate that you will give.

Q. Five or 6 per cent?—*A.* I do not think so.

Q. The rate of interest being a matter which has to be determined by existing considerations at the time, that is a matter of detail?—*A.* Yes.

Q. But if the Government guaranteed what may be regarded as a fair rate of interest, you think that private enterprise would invest its money in such a bank?—*A.* If Government give a permanent guarantee, no doubt, a certain amount of money will be forthcoming, but I should doubt very much if only a guarantee for a term of years is given, because it is an entirely speculative question as to whether this bank will succeed or not. It will all depend on the success of the industries that they finance and the success of those industries will depend upon the particular expert staff that the bank has from the beginning.

Q. Have you studied the growth of Japanese industries during the last twenty or thirty years?—*A.* I have not made a detailed study of it.

Q. Or of the German industries with reference to the methods of banking?—I am quite well aware of the conditions in Germany and how they have sprung up. They have sprung up gradually. They did not start one great big financial corporation. They started a network of banks that have to a certain extent invested their money in industrial concerns, but they have actually furnished a large portion of their share capital and in that way in spreading their risks over a great many things the successes have made up the losses, and that is where the difference comes between taking up a large share in the capital and lending your money out on debentures to these things, because your losses in the latter case are not compensated for by increased capital value of shares in successful enterprises as in the former case.

Dr. Hopkinson to the Hon'ble Pandit M. M. Malaviya.—*Q.* What are those German banks?—*A.* I have not got the exact names just now. They are mentioned in the Report of the Monetary Commission of America which deals distinctly with the question of the methods of German banking of industries.

Hon'ble Pandit M. M. Malaviya.—*Q.* Of course, safeguards will be provided and nobody will wish the Government to leap into an enterprise blindly, but with due safeguards you think that a system of financing industries through the medium of an industrial bank, which you might call by the name of industrial corporation if you like,—would be able to afford much assistance to new industries here?—*A.* I am quite prepared to admit that and I should like to see it come about.

Q. We want you to help us with definite and practical ideas as to how it might come about?—I have indicated in my note the way in which it could be brought about, and that is by Government pioneering large industries, that is, industries that are ely to extend largely, and that will form the nucleus capital of the industrial bank, d then it will gradually develop further. They will have no deposits in the strict ıse, but inconvertible debentures.

Q. The difficulty in pioneering is that Government can pioneer only industries which ve not been developed?—*A*. It could not be pioneered if already developed.

Q. And therefore that would limit the scope of Government assistance very narrowly you confined it to mere pioneer factories?—*A*. Yes. I believe there is plenty of om.

Q. But there is also plenty of room for other industries which cannot be called pioneer lustries now, but which need to be developed in order that the immense quantity raw materials which we are exporting at present should be manufactured in this untry?—*A*. Yes. There you have got to consider the interests of those people that ve done pioneer work, and that have in earlier stages lost heavily over it and are w legitimately looking to their profit from their determination in carrying it through.

Q. Nobody would wish that any private enterprise should be hurt by any assistance at Government gives, but at the same time you should remember that there is a lot of ticles being imported into this country?—*A*. Yes.

Q. And when you have to fight against these imports you do need Government to nder all the assistance possible to develop our own raw materials?—*A*. I am quite agreement with that.

Q. You have been in favour of a State bank being established for many years?—*A*. es.

Q. Am I right in understanding that you think that the State bank should be a ivate institution?—*A*. Yes. I think you have got the nucleus of it already.

Q. And you want the existing Presidency banks to be incorporated into the State nk?—*A*. Yes.

Q. And the shareholders of the Presidency banks will continue to be the shareholders the State bank?—*A*. Yes.

Q. Would it not be a contradiction in terms to speak of it as a State bank?—*A*. You n talk of it as a central bank. The Bank of England is a private institution with ivate shareholders.

Q. The Bank of Japan is a State bank, half the share capital of which belongs to e Government and the other half to the general public. You think that the paper ırrency should be made over to this bank. Don't you think that paper currency ill receive a rude shock if a private bank takes up this business?—*A*. I do not see ıy other trouble at all. I should advocate, of course, that it would be still Government note under the Bank's control. It will simply mean that the credit of the overnment will be behind it plus the credit of this bank.

Q. You do not expect the Government to take any responsibility, that is, moral sponsibility for the successful working of this bank?—*A*. I do not say for the successıl working of this bank, but they can guarantee the notes that they issue.

Q. Why should not they keep it in their own hand?—*A*. Because of the requireents of the country that wants to expand in trade. It is a question of providing curncy at the time the country wants currency, and under bank control currency would ıturally expand when required and diminish when it has served its purpose.

Q. Is not Government in a much better and immensely superior position to give ıat elasticity to the banking system than any private concern?—*A*. I do not agree.

Mr. C. E. Low.—*Q*. Was it not the difficulty in America?—*A*. Yes. If the Govnment handed over the paper currency to the bank, they would have a very large ntrol in the management of the State bank and they would also have a very consirable share in the profits of the bank.

Hon'ble Pandit M. M. Malaviya.—*Q*. You want Government to have a large control ı the management of the bank and to have a share in the profits too?—*A*. Yes.

Q. You advocate it largely on the basis of what obtains in England on the Bank of ngland system?—*A*. I do not advocate the Bank of England system at all.

Q. Is not the modern tendency both in America and Germany according to the eport of the Monetary Commission of 1908 and the discussion that took place in ermany after the crisis of 1908, against the suggestion that you make for a privatewned bank like the central bank?—*A*. I do not think so at all. The American crisis as due to different things.

Q. Has not the discussion been against the view that you are advocating?—*A*. No.

Q. If it was decided to start a State bank without this private ownership but a real tate bank in the full sense of the term, would you be still in favour of it? The bank ould command and utilise the Government balances both here and in England, also the aper currency reserve and the gold reserve?—*A*. I always think that it is a good thing make use of what you have got and you have got the nucleus of it already in the residency banks.

Q. If a State bank like the one I have indicated to you were started, would not the balances which the Government of India and the Secretary of State possess be more largely available for the development of Indian industries in India than they would be under your system?—*A*. No. So far as I see, exactly the same, only minus private capital.

Q. I include in the balances, paper currency reserve and the gold standard reserve?—*A*. You have all that in my scheme and you have private capital in my scheme in addition.

Q. You have not considered how the general Indian public will view a proposition like yours?—*A*. That is a statement not a question.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. You have just said that you advance loans to the cotton spinning and other concerns on two securities?—*A*. Yes.

Q. You do not take the liquid assets too? They give you a statement of the liquid assets they possess?—*A*. Yes.

Q. Generally you advance to rice mills and other concerns through hundis?—*A*. No.

Q. You directly deal with them?—*A*. Yes.

Q. You send currency from here?—*A*. From the branches. We have treasury branches and finance from there. Also to a certain extent we finance on the joint pronote of the two managers. The mills are largely conducted by a small co-operative society of 12 or 20 people who collect together, of whom two are the managers and these two will give us a joint pronote for a certain amount. There is a limit fixed and the remainder of the shareholders will give a personal guarantee and that provides sufficient for ordinary working capital. In addition to that, when they want to take the opportunity of favourable prices and make large purchases of paddy, paddy is bought and put in the godowns and they hypothecate it to the bank and we advance against it.

Q. That is during the paddy crop season?—*A*. It works pretty well all the year round.

Q. And it does not lie idle?—*A*. It is utilised more or less the whole year round.

Q. Do you advance largely on imports, or the financing of crops and industries or do you do hundi business?—*A*. To a certain extent, we advance on hundi business that is, among the shroffs, and perhaps we may have as much as 50 or 75 lakhs out to them. We have a particular class of Indian banker called the *Nattukkottai Chetti* and we advance largely to him and he in turn advances to the outlying places where we have not got any branches. As a matter of fact we advance to a very large extent for the Burma rice crop. A lot of money goes from Madras to Burma to finance the Burma rice crop.

Q. And do you finance the established industries which you name?—*A*. Yes.

Q. You have never refused the big industrial concerns here any large loans?—*A*. Not any reasonable finance they want.

Q. You are for Government help. Do you think that Government ought to advance money on machinery on deferred payment system?—*A*. I see no objection to it on principle. Every case has got to be decided on its own merits.

Q. You know we are considering a scheme about Directors of Industries and the Boards of Industries. Should they recommend to Government what industries must be financed or what people must be supported to start new industries. The Government will have their experts who will go down to the place and they will find out whether it is feasible or not, and the Board and Director will say whether these men are capable of starting the industry or not, and on that recommendation the Government ought to help the particular industry. Do you think that Government should deal with these different concerns directly through the Board of Industries, or should there be some financial bank or corporation as suggested by many witnesses? Supposing there is a Government industrial bank and the Board of Industries recommend the bank to advance such an amount as Government has approved, do you not think that it would be a much better machinery than Government directly dealing with the different concerns?—*A*. In this Presidency I think it is better to be direct from Government to start with at present and until industries are much further developed.

Q. After the industries are developed can it be done?—*A*. In Bombay it is a different question altogether, or Calcutta where you have large jute industries.

Hon'ble Pandit M. M. Malaviya.—*Q*. What is this itinerating expedition to Europe to find out a means of disposing raw materials? Who have sent this expedition?—*A*. It is not solely for the raw products but to increase the trade generally of India and to try and develop it.

Q. Who has sent this expedition?—*A*. It is largely financed by the Madras Chamber of Commerce.

Q. And how many gentlemen have gone?—*A*. Two gentlemen. One is a Government official, that is, the Director of Agriculture, and the other is the Deputy Secretary of the Bank of Madras. The expedition is to Russia and France.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* On your side is the wealth very much divided up? There are no big capitalists to start big concerns, are there?—*A.* No.

Q. You recommend that Government should start big pioneer industries?—*A.* Yes.

Q. And if worked successfully hand them over?—*A.* Yes.

Q. To whom, because you say that there is no capital in Madras?—*A.* Turn them into a joint stock company and dispose of such shares as they can, but holding a controlling interest in order to be able to develop.

Q. Don't you think that there would be mismanagement?—*A.* I do not think so. The probability is that you will find concerns in Calcutta and Bombay will be glad to come down and take a share.

Q. That would not be a good thing for Madras, would it?—*A.* I do not think it would be bad. It is developing the country, because, after all, the amount that goes by way of dividend on an industry is only a small portion of the benefit that the country receives from the industry.

Q. Then there will be a cry that Bombay and Calcutta will drain Madras? But don't you think that, in place of that, if the Government starts small pioneer factories and teaches the people that they can do likewise the successful small industries will be taken by small capitalists just like the rice mills?—*A.* It will do good eventually, but there are very few small industries that I can think of that will turn out into a big industry. The rice mill is here because it is one of the biggest products that we have got here and rice mills have developed very quickly. But take cotton, it is another thing.

Q. Don't you think that it is necessary for the Government to take up big industries and pioneer them? I think they can get enough capital from the capitalists if they give them something like preference or guarantee, and it is on the Government side that they are not willing to encourage it?—*A.* If you can start industries with outside capital you can do it.

Q. We want Government to guarantee interest?—*A.* I do not see the object of guarantee if outside capital is coming in. I have no objection except that if there is a guarantee there must be a guarantee on the other side that it will not be made a close monopoly.

Q. There should be no monopoly?—*A.* No.

Sir D. J. Tata.—*Q.* What do you mean by a monopoly in this case?—*A.* If there is a pioneer industry?

Q. You refer to something of that kind in your evidence. How could it be a monopoly?—*A.* If Government guarantees interest in the first stages of this industry—there will be a good deal to find out, many mistakes are made and money is lost to start with. Government has made this good and the industry has been started on a sound basis. Government has got all the knowledge of the mistakes that have been made before and is in a position to develop, but if instead of developing by formation of subsidiary companies Government hand over the whole concern to private capitalists the industry will probably become a monopoly.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* With 28 years of experience in this Presidency can you suggest to us any way by which we can make the Madras Presidency more industrial?—*A.* I think there is a decided opening in the products of the cocoanut tree on the west coast, and ground-nuts which are very largely grown in this Presidency, and I think that there is a good deal more to be done with cotton and possibly with jute. You have got a substitute here though it is not the same jute as the Calcutta jute, but it makes the most excellent gunny cloth.

Q. Do you think that the people have not got the right sort of education to go into industries in this country and that makes all the difference that technical and industrial education has not advanced very much and that people take to literary education?—*A.* I do not think that has very much to do with it though it may have something.

Q. Do you get your clerks and other employees here easily?—*A.* Yes.

Q. Have they been trained in colleges?—*A.* No. We train them ourselves.

Q. How do they get bank experience?—*A.* In the banks. I went into the bank without any technical training.

Q. If you have a commercial college would those students who pass out from it be useful to your bank?—*A.* I have no doubt that they would be of very considerable use. As a matter of fact, we have a small commercial school at Calicut and we have certain clerks from there who have turned out quite successful.

Sir D. J. Tata.—*Q.* In appendix II you talk about rice mills and cotton ginning factories. Are these for export purposes?—*A.* Cotton ginning is not all for export. From these cotton gins local mills take a certain amount.

Q. Rice mills?—*A.* Except a small amount for export to Ceylon and Mauritius rice is all for internal consumption.

Hon'ble Sir R. N. Mookerjee.—*Q.* From your experience of the working of the Madras Bank, do you think that a modification of the present Act will be advantageous and should be adopted—I mean on general lines, and I am not talking about any particular point?—*A.* In some ways, it might be modified. I do not think that it is altogether a model of perfection, but it has answered very well indeed, and certainly some of the restrictions are, on the other hand, considerable safeguards.

Q. I do not mean absolute alteration?—*A.* It is questionable whether it will be advisable or not to allow the Presidency banks to advance against the security of good marketable industrial shares. There is a danger in it. We know what happened to the old Bank of Bombay.

Q. All the same you do not mind having that Act a little less stringent?—*A.* I have no objection. After all, it is a great deal a matter of management.

Dr. E. Hopkinson.—*Q.* I believe the Export and Import trade of India is financed by the Exchange Banks?—*A.* Yes.

Q. The Presidency Bank hardly touches them?—*A.* We are debarred from touching exchange operations.

Q. The business of the Presidency Banks is chiefly to finance established industries?—*A.* Yes, and for the financing of the crops that are afterwards exported also to a certain extent when the exchange banks' bills for imports are overdue the merchants will take advances from us against the goods and pay the bill of exchange. They will also discount their trade bills as they sell at pretty long credit to the dealers who take the goods up country.

Q. The security in that case is the crop?—*A.* Yes, or the bill.

Q. It is not both?—*A.* No. Take an importing merchant who imports all his goods. He pays his bill to the exchange bank and hands over the goods to the bank, and afterwards he sells the goods to a dealer who sends them up country and he gets the dealers' bills so many months after date and that bill is discounted with us and the stuff goes away.

Q. The crops, in some cases, may be a growing crop?—*A.* No. The Presidency Bank is debarred from financing against growing crops. Indirectly, it might advance against growing crop, by having the personal security of two persons.

Q. The growing crop is not financed either by the Presidency Banks or the Exchange Banks?—*A.* Excepting as I say by the personal guarantee of two persons. We might have two ryots growing paddy in adjoining fields and they would come jointly and give a pronote for say Rs. 20,000 in order to finance their growing crops.

Q. I think in some part of India growing crops are financed by some banks?—*A.* Yes, but not by the Presidency Banks. The Presidency Banks have got the Presidency Banks Act.

Q. Are there any banks in Madras or the Madras Presidency who do finance growing crops?—*A.* Not that I know of. I do not know whether the Indian Bank does or not. So far as I know, the Indian Bank confines its business very largely to Nattukkottai Chetti.

Q. I understood in reply to Sir Fazulbhoy that you said that in every case the personal security of the directors of the business or the managing agents was taken in regard to cotton, spinning and jute mills?—*A.* We divide them into small and large industries. Cotton weaving and spinning mill will be a large industry with a big capital and with managing agents and we take the joint pronote of these two and give them credit on account and they can run up and down as they require money and send us a list of their stocks every month.

Q. The smaller industries?—*A.* In the case of smaller industries, we advance a small amount on the joint pronote of those interested and then the balance against stocks, which are left under the bank's control.

Q. You never take any debentures?—*A.* No.

Q. Are you debarred from it?—*A.* I could not take any debentures.

Q. I suppose you can finance any such industry if personal guarantee is forthcoming?—*A.* Yes.

Q. So that, you conduct your banking business exactly on the same lines as that conducted at home?—*A.* Yes, on very much the same lines.

Q. Do you advocate any extension of the powers under the Act which would allow you to take other forms of security?—*A.* I would not strongly advocate. I would not raise any objection to having power to advance against the shares of mercantile concerns. I think it might be helpful to industries but there are dangers. It is a question, if it is carried to a large extent, whether it does not tend to a lock up.

Q. Do you, in your experience, have many applications for loans from small industries which you refuse on account of security?—*A.* Not very many. There are very few that we have absolutely turned down. There may be some small cottage industries in places which we would not touch.

Q. Are they properly provided for by the co-operative banks?—*A.* No.

Q. But you would state broadly—of course, there might be exceptions—that, in your opinion, there was no great need for further financial facilities for small industries?—*A.* I do not think there is any very great need.

Q. Supposing your answer had been otherwise on that point and you had said that there was a need, it is our duty to try and see how that need could be supplied. It seems to me that there are three courses open by which the object can be attained, and I should like to have your opinion on each one. Take the first. Supposing an industry of this kind—I take for example aluminium, because Madras always thinks of the aluminium industry—is to be started and a thorough investigation is made by Government both as to its technical and commercial success, and the Government undertake to give any expert advice which is required, do you think that under those circumstances capital would be forthcoming? Would such Government assistance be an inducement to both Indian and British capital?—*A.* I think it will have some effect undoubtedly. I think some sort of financial guarantee is necessary.

Q. There are many ways in which it can be given and one way that we hear of is through an "industrial bank." Let us try to understand what is meant by an industrial bank. The industrial bank will be an institution for the purpose of lending money and I presume it would lend money on interest?—*A.* But I think it will be more than that. Would it not include the provision of a very large proportion of the share capital?

Q. It will take a part of the share capital?—*A.* Yes.

Q. How are funds to be provided for it?—*A.* By share capital and by debentures.

Q. Who are to be the subscribers of the share capital?—*A.* That is the difficulty. I do not know in this Presidency where the capital is to come from.

Q. Where there is a difficulty we must face it?—*A.* I think in this Presidency there will be a great difficulty in getting capital. In Bombay there will not be any difficulty. In Bombay there is very much more wealth than in Madras. The wealth of Madras is very much spread out among a number of small landowners. There are few large landholders.

Q. Here in Madras you look to Government for providing capital?—*A.* I look to it in the initial stages.

Q. And you propose that such a bank when constituted should receive money on deposits?—*A.* No.

Q. That would be contrary to all banking principles?—*A.* Yes. They might use them so far as they finance local stocks, but their chief resources would be debentures and capital.

Q. In Madras it comes to this, that the Government finds capital for the bank and the bank employs that capital in taking up shares in industrial enterprises?—*A.* Yes.

Q. Is there a distinction between it and the Director of Industries taking up shares in individual enterprises?—*A.* If the Government take it up themselves, they will only be able to put in Government money, but if they start this industrial bank with a capital the nucleus of which they have got in the shares, they will be able to get outside money against debentures.

Q. You just said that outside money would not come?—*A.* I do not think that in Madras it will come to a large extent.

Q. And it comes to this, that Government finds the capital and employs that capital in taking up shares in various concerns?—*A.* Yes.

Q. Is that banking at all?—*A.* No.

Q. Is it not foolishness to talk about an "industrial bank" in this connection?—*A.* I would not go so far as that, because I think we have got to look at the future. If you have this industry started, you then begin to create wealth which will come in time.

Q. What I want to get at is, why call it an "industrial bank"? It is no more than the Government directly taking an interest either in the form of guarantee or debenture or share capital in particular enterprises?—*A.* At the beginning there will be no difference.

Q. How do you think that a difference will arise in course of years?—*A.* When the industry has proved itself to be successful, there is always some one who will come forward and take up some shares.

Q. The shares which were held by the Government?—*A.* They will part with a certain number of the shares.

Q. When the shares come to a premium the Government will sell?—*A.* Yes.

Q. Why should not Government make the profit instead of the bank?—*A.* It really makes very little difference, as the profit that they make does not go towards reducing taxation.

Q. Is there not a disadvantage in what we call an industrial bank in this respect, that when a proposition goes wrong it may be hidden, whereas if Government were directly interested in any individual industry, the light of public opinion would be brought to bear upon the thing, and any mistakes made would come to light?—*A.* I do not think there is any very great difficulty and I do not think that mistakes will come to light in Government reports. I should think that they would come to light in the same way if there was an industrial bank.

Q. In reply to Mr. Low you described some of the obstacles to the expansion of banking business especially in country districts, but you did not mention one factor which I should like to know whether you consider of any importance. At what rate of interest do you lend money on reasonably good security to some one in the mufassil?—*A*. We will take for instance, cotton mills. Up till quite recently, the rate was 5½ per cent to a good sound concern—a big concern.

Q. And what do you allow on deposits?—*A*. We are allowing at present at the same time, 4 or 4½ per cent.

Q. And what rate does the village bania get from the cultivator?—*A*. Twenty-four or 36 per cent. It is not actually in the amount of interest that they get upon the loan, but the ryot has got to sell his produce to him at a low rate.

Mr. C. E. Low.—*Q*. Is it not a fact that these men are making an enormous number of bad debts?—*A*. I should think they make a very fair number.

Q. I have heard it said, but I could not subscribe to it, that a bania on an average makes 7 or 8 per cent on his capital?—*A*. That is a moderate estimate I should say.

Dr. E. Hopkinson.—*Q*. Assuming that a man in the mufassil with capital can only get 4½ per cent from the Presidency Bank and 24 per cent by lending money otherwise with a certain amount of risk, don't you think that it is natural that he should prefer to employ his capital in the second way rather than the first?—*A*. Undoubtedly, that is quite natural.

Q. That is the real obstacle to the extension of the banking system?—*A*. To a large extent. In the agricultural districts here one large ryot lends to the smaller ryot, with the hope that eventually he would get the smaller ryot's land which is adjoining his own.

Q. Do you think that it is possible by legislation to limit the rates of interest?—*A*. I should be very doubtful whether it would have any real effect. There are so many ways of getting round it. They would make it good by having an agreement to hand over the produce at a certain rate.

Q. Admittedly this great evil exists, do you think that the best way of combating it is by an extension of the co-operative banking system?—*A*. Yes. There is no doubt that an extension of banking generally would be beneficial. The competition of persons ready to lend money is the best way of knocking down the rate of interest.

Mr. A. Chatterton.—*Q*. Is it not a fact that at the present time the Nattukkottai Chettys receive considerable deposits from people in the country?—*A*. In some parts I believe they get a certain amount.

Q. They pay about 9 per cent. on fixed deposits?—*A*. Perhaps they do. I think they probably pay about 6 per cent on running accounts.

Q. You have suggested that the extension of the co-operative banking system is perhaps the best way of dealing with these smaller industries and financing them. Can we contemplate people who control these co-operative banks being able to get the necessary technical and general business experience to enable them to carry on that work especially in the initial stages?—*A*. I cannot say that. I have not thought these details out. That is a point that has got to be considered in connection with the co-operative movement. At present the co-operative movement here is practically confined to money lending to the ryot.

Q. What we have to consider here is what means should be devised by Government or by private persons to finance industrial enterprise in this country and to bring about a gradual growth of industrialism, and various methods have been already discussed this morning but no reference has been made to a past method. You are, of course, aware that there were a number of agency houses which were practically private bankers and that they received very considerable deposits which were employed in furthering industrial enterprise?—*A*. Yes.

Q. And that system has broken down almost entirely?—*A*. Yes. It has quite gone out now.

Q. Is it desirable or possible to revive it?—*A*. I do not think it is desirable It was dangerous.

Q. Dr. Hopkinson has dealt with the question of an industrial bank or industrial corporation, and I understand that you are in favour of Government pioneering industrial concerns and finding money to start them and to a certain extent I am in agreement with you, but the difficulty I foresee from past experience in such matters is that if a Department of Industries undertook such work it would also be necessary to get released from the ordinary Government restrictions under which ordinary official business is carried on. I do not think it is practicable, for instance, to carry on commercial work under the audit of the Accountant-General and it would be necessary to create a new system of Government control quite different from that to which the ordinary Government departments are subjected?—*A*. I agree to that.

Q. Apart from those large industries which, in the first instance, before we can take up, must be the subject of detailed enquiry and probably also of a considerable amount of experiment—which will take time—we must also try and cover the country with a network of small industrial concerns to deal with the agricultural produce of the country to enable it to be put on the market in a more profitable form than at present and we have also to develop what are called cottage industries. Do you think that the system that we have been experimenting with in the south of India is a satisfactory one and likely to lead to useful results? We are making takavi loans under an Act with which I think you are acquainted and we also supply certain types of machinery to people on the hire purchase system at easy rates of interest whilst the loans are repayable on tolerably easy terms. Under this system we are lending in a province like Mysore nearly two lakhs a year at the present time, and probably it can be developed to four or five lakhs a year without forcing the pace too much?—*A*. Is it five lakhs that goes out in addition to what comes in?

Q. No. The total loans in each year would not exceed five lakhs, so that on a five year period for recovery the total capital required would only be 25 lakhs. Now would it be practicable for the Presidency Bank with a guarantee from the Government to take over this business and finance it in the same way, or would it be possible to establish separate banks to deal with it?—*A*. The Presidency Banks Act may be amended.

Q. I want to know whether some private banking agency or co-operative banking agency could be devised to take it up?—*A*. That is a case for a co-operative banker.

Q. Do you think that our present methods are a satisfactory way of developing all these smaller concerns?—*A*. I think so. I do not know how they can very well be developed otherwise.

Q. Might the same thing be applied, as experience increased in the Department of Industries, even to larger concerns, or would it be better to devise some separate method?—*A*. I do not think that co-operative societies can be got to develop these so quickly as to be able to do both.

Q. You have told Dr. Hopkinson that there is no scope here for an industrial bank or an industrial corporation?—*A*. Yes.

Q. It has been put to us on several occasions that an industrial bank may be established for the whole of India. Do you not think that it is too big an area for one financial corporation to operate upon? Would it be advisable to endeavour to establish such a big corporation?—*A*. It would be very difficult for one corporation for the whole of India to be able to examine thoroughly the requirements of the various provinces. You cannot have a large number of branches. It is a different thing from having a central bank for the whole of India and you have branches all over the country.

Q. Supposing you have one large industrial corporation for the whole of India, can you uitlise the local Departments of Industries in each province to make all the necessary investigations and to act as a sort of intermediary between the people who want to start industries?—*A*. That may be possible, but then you would require to have a constant representative at each place where that industry is working.

Q. You point out perfectly clearly that in any industrial corporation or bank you require a very expensive and extensive staff to deal with all matters. The larger the area, the more fully would you utilise this expert staff?—*A*. You will have to utilise some other agency still.

Q. What should be that agency?—*A*. If you have the Central Bank with branches everywhere making this as a side show of their business—more or less to be agents.

Q. Do you think that in India it would be justifiable to establish a central experimental laboratory costing five to ten lakhs and manned by a proper staff to work out all the various problems connected with, for instance, the oil industry in their scientific and technical aspect, so that we might make the best use of the raw materials that we have got?—*A*. I would say for industries generally.

Q. You think that it will be justifiable for Government to spend money in that direction?—*A*. If it is going to lead up to a very large industry.

Q. You cannot say at the outset that it is going to?—*A*. At the outset you can say whether there is a reasonable prospect for it.

Q. You have stated that there is very great difficulty in getting at the private hoards of small people. Do you think if it would be of use if the post office savings banks were made a little more popular and more facilities were given and a higher rate of interest was paid on deposits?—*A*. It might attract more money, but it will not help the general financial situation at all excepting in so far as Government railways are concerned.

Q. It is simply a first step towards encouraging the money to come out rather than keep it in their houses?—*A*. I do not know whether the raising of the rate would attract so much money as would counterbalance the actual expense.

Hon'ble Pandit M. M. Malaviya.—*Q.* You endorsed Dr. Hopkinson's criticism of the industrial bank. But the industrial bank that he foreshadowed was different from the one that I suggested?—*A.* Yes.

Q. I suggested that Government should guarantee interest and I never suggested that Government should take a number of shares in the concern and directly come into the business in that way?—*A.* Yes.

WITNESS NO. 235.

Mr. F. G. WARBROOK, A.M.I.M.E., *Director, Massey & Co. (Limited), Engineers, Madras.*

WRITTEN EVIDENCE.

Financial aid.

If money is needed in commercial enterprises it is worth paying for, and it appears unwise to give financial assistance to a concern which cannot afford to repay a loan and pay the interest on it, except in cases in which Government wish to have experimental work carried out by private agency, which otherwise they would have to carry out themselves.

Different industries in different stages of development require such widely different methods of support that it is impossible to formulate general rules with reference to the form of financial aid to be offered by Government. In many cases, the supply of machinery on the hire purchase system would meet the case, but in others it would be eminently unsuitable, and it will probably be found necessary to consider each case on its own merits.

The purchase by Government of locally manufactured articles in preference to imported articles provided quality and price do not widely differ is a form of support which appeals with force to the engineering industry, and the spirited observation of existing rules on this subject would do much for the industry. This is being fully dealt with by the Indian Engineering Association, with whose views I agree.

Pioneer factories.

I can find no objection to the establishment of pioneer factories by Government in cases of industries new to this country. It is in my opinion essential that business and engineering experience be brought to bear on such operations, and unfortunately we cannot be sure of obtaining such experience in the Director responsible for the operations. Unless this business and engineering experience is brought to bear, I consider the cost of the factories is prohibitive, and to a great extent is money thrown away, inasmuch as the results attained by the total expenditure involved could be improved on with perhaps less expenditure and in a fraction of the time taken by present methods if the work was directed by business engineers.

When a pioneer factory has demonstrated the fact that an industry is a commercial success as managed by Government we can safely assume that it will pay under private control and the question of handing over to private management, or its continuation as a Government factory should then be considered. I find it difficult to formulate a covering principle applicable to all possible cases.

The fact that an established external trade already exists in any particular commodity appeals to me as the strongest argument in favour of an investigation with a view to local manufacture, and I can see no reason whatever why any limitations are needed in this direction. Demands exist which must be filled by local effort or foreign effort, and the avowed object of all Indian industrialists is to replace foreign effort by local effort, with which object I agree.

With reference to Government competition with existing enterprise, I am of the opinion that this should be avoided, wherever possible. Government cannot hope to compete fairly with locally established industries owing to the absence of financial interest and responsibility of the men in charge.

Government competition can be avoided in most cases, as the underlying idea is in some cases to improve the product and there appears to be no need to duplicate an already existing plant in order to produce the crude material needed, which could quite well be brought locally, at a cheaper rate than Government can manufacture it.

Official organisatio

The development of general industries calls for expert engineering knowledge, expert business knowledge and expert chemical knowledge. When the development is undertaken by Government, a knowledge of Government procedure is also needed, and the ability to organise the department on practical lines to meet the prevailing needs and conditions.

No one man can reasonably hope to combine the essential qualities required, and Government service does not tend to produce such men. Under present circumstances with a Director and without a Board of Industries, efforts at development are entirely in the hands of the Director, whose predecessor may have left legacies in the shape of embryo industries in which the present Director may have no faith possibly with good reason. In any case, such embryo industries cannot expect the attention given by their founder from a Director not in sympathy with the effort, and a Board of Industries, being more constant in its composition than Directors of Industries, would in all probability show much greater continuity of effort, and better practical results. The knowledge available on a Board could be standardized within narrow limits, whereas it is quite impracticable to standardize Directors of Industries. I am therefore in favour of a Board of Industries, for this Province, together with a Director of Industries.

The Board might consist of mechanical, electrical and chemical engineers, and business men, all with a thorough and practical Indian experience and knowledge of conditions as they exist here. The Director of Industries should be a good organiser, essentially an engineer and would be ex-officio Chairman of the Board.

The Members of the Board should be the cleverest men available, official or otherwise Their ideas as a body would be carried out by the Director of Industries and they would need the power to obtain and pay for expert opinion on any subject on which their own knowledge was felt to be insufficient. The Board should have power to add to their number if found desirable, and generally be vested with the highest possible powers.

Exhibitions.

It is difficult to prove that industrial exhibitions have a cash value, but they offer an excellent advertisement to the exhibitors and in many cases it is possible to say with certainty that an exhibit has been a commercial success. My experience of exhibitions has been uniformly good, and I have no hesitation in saying that their value is great, and that Government should encourage such exhibitions.

Sellers and buyers will come into contact whether exhibitions are held or not, and I am inclined to think that the greatest good of exhibitions lies in the fact that they convert dreamers into actors, and result in the purchase of machinery which, without the exhibition, would possibly never be purchased, or perhaps purchased some years hence. Undoubtedly exhibitions should be popular in character, but I am inclined to think that a permanent exhibition of machinery suited to Indian industries with the annual addition of a popular section would be more useful than an annual exhibition alone, and could be combined with a commercial museum such as exists in Calcutta, and should exist in Madras.

Training of labour.

I do not think that the training of labour as at present offered by Government in Madras will serve any good purpose, inasmuch as a boy working in an engineer's shop after a day's work at his trade, is naturally not keen on spending his evenings at the same work, and probably having to pay a fee to do so, nor is he keen on learning some other man's work. No outside training can equal that obtained in a commercial works if we admit that say a good turner is to be the finished product. But his general knowledge of engineering might be widened with advantage and any latent ambitions he may have thus aroused, but the only way to do this appears to be to offer the information in a much more palatable form than lectures. I suggest the use of the cinematograph, as the most practical means of imparting such information. This instrument is already in use for the same purpose, and suitable films for the engineering industry already exist, as well as for many other industries. The industrial films might be accompanied by verbal explanations in the vernacular, and I think a course wrapped up in such a disguise would appeal strongly to both the younger and older engineering employees, and what is more important still, would place before parents a view of the industries dealt with which would tend to induce them to look more favourably on industrial pursuits for their children.

The faults of our local trades school are that it is only open to those already engaged in the industry, and to those who understand and write English. Apart from the Anglo-Indian community, these conditions close the classes to nearly all but the best and older workmen, who neither need nor wish for practical training, as few young Hindu boys in engineering works are able to understand English, and are consequently unable to take advantage of the course offered.

I have from time to time accepted offers of intelligent caste youths for training as engineers in our works, but in no case has the youth been able to face the "degradation" of manual labour for more than a few days. The product of Engineering Colleges appear unwilling to "go through the mill" of practical work, and consequently their college training is of no use to practical engineers. Only one case has come to my notice in which a graduate was prepared to go through a course in the works, and he demanded 50 per cent higher wage than the most skilled workmen we employ. It is evident that the better class of Hindu and the college graduate look on manual labour as degrading, and are not prepared to undertake it, and that the Engineering College graduate considers his training as complete on graduation instead of just commencing. Until the dignity of labour is appreciated by the better classes and engineering graduates grasp the fact that they are eminently unfitted for responsible posts, very little headway can be made in the direction of a local source of supply of supervision as required in engineering works, and we must continue to import what is required.

Looking at the matter of supervision from the commercial engineer's point of view the qualities essential in a supervisor are a reasonable application to duty, a good general knowledge of engineering practice covering the work carried out in the workshops, a fair degree of craftsmanship, literacy in English and honesty. Manual work in a commercial concern is the only gateway to the craftsmanship required. In view of the "customs of the country" the degree of commercial honesty called for by all employers is very difficult to obtain. I have come to the conclusion that the only practicable local source of supply of skilled supervisors for engineering works is the Anglo-Indian community, and an experiment is now being made in this direction, but it will take some years before definite results can be arrived at. I admit the existence of really first class Hindu foremen, but they are scarce and difficult to obtain.

Apprenticeship as known in European countries does not exist in the engineering industry in Madras. The sole object of a youth and his parents is to realise the greatest return for his labour in as short a time as possible, and if a change of employer carries with it an increase of one or two annas per day, the change is promptly made. This habit results in a crop of turners, fitters, etc., but no general knowledge of the industry which is so badly needed at the present time. Undoubtedly the present want of system results in the production of a number of first class tradesmen, each capable of turning out first class work under close supervision, but the supervision has to be very close, and there is no local source from which this supervision can be drawn. Apprenticeship on European lines would do much to fill this want, provided intelligent youths were available, but suitable evening classes would be needed to provide the specialised education required, or "sandwich" courses could perhaps be arranged with the Engineering College.

ORAL EVIDENCE, 30TH JANUARY 1917.

Sir F. H. Stewart.—*Q.* You are a Director of Messrs. Massey & Co.?—*A.* Yes.

Q. Do you specialise in any particular form of engineering work?—*A.* We have not done business to any great extent in manufacturing engineering. We are doing so now. We are going in for oil engines and pumps.

Q. How long have you been in the country?—*A.* Eleven years.

Q. I gather from your note that you quite approve of Government assisting industrial enterprises, but you point out the need for very great care in the way in which it is done, and with reference to pioneer factories you point out the need for particular care there. You think it is essential that engineering experience should be brought to bear in such cases. Do I gather that you think it would be a good thing after Government have gone in for the *pros and cons* to associate business men with the Government from the very start?—*A.* I think that the business element and the engineering element should come in while investigations are being made.

Q. When they were completed you would leave the whole thing in the hands of Government?—*A.* No, I should still have the engineering business experience.

Q. That would be that Government should provide the educative part, and would also provide an outlet for somebody to take over the industry when it was established?—*A.* That is quite possible.

Q. With reference to the Board of Industries, we gather from your note that you don't think that what has been done here has been successful in the past, but you are in favour of a Board of Industries. Would that be advisory or executive?—*A.* Executive.

Q. You mean that the Director then would be the servant of the Board?—*A.* Yes.

Q. And the Board should be comprised of engineers and business men, practical men?—*A.* Yes.

Q. Would it be permanent?—*A.* I think it would be necessary to have it permanent.

Q. Would you pay the members of the Board?—*A.* That is rather a large question.

Q. You might be asking a good deal of them?—*A.* We may, and in that case they may probably require pay. Look at it from another point of view; if the advice is worth having it would be worth paying for.

Q. Considerable demands would be made on their time, and you want the best men?—*A.* That is so.

Q. You approve in the main of industrial exhibitions?—*A.* Yes.

Q. But you are not quite clear that they are much good as selling emporia too. Don't you think that they could be combined to a certain extent?—*A.* Yes. I make a suggestion in that direction. I think I go on to say that exhibitions do make buyers of people, who would probably not be buyers otherwise, by being educative.

Q. Then you refer to the training of labour in Madras; you don't think that is really practicable. What you recommend is something that will interest the boy straight off, and you are pretty clear that instruction should be in the vernacular?—*A.* Yes, that is essential in Madras.

Q. Do you do anything yourself in this direction with your employees?—*A*. We have not done anything up to the present. We have just started a scheme of apprenticeship, and I think we shall find it necessary to give the apprentices what education they need.

Q. Take them away from their work and really teach them?—*A*. Yes.

Q. How many men have you got?—*A*. Between 250 and 300.

Q. And do you find the supply is equal to your demand; have you any trouble in getting men?—*A*. We have trouble in getting the higher class of men, the more skilled workmen.

Q. And that you attribute to the fact that you do not consider the training available here for such men suitable?—*A*. Yes. As a matter of fact the accuracy which we demand in our shop is not demanded anywhere else in Madras. There are no men, and we have to get men and train them.

Q. Are you meeting with success in trying to do that?—*A*. Yes.

Q. Do you find that you are able to keep your men when you have trained them, or are they apt to go off elsewhere?—*A*. They are apt to go off elsewhere. If we have good men we have to pay them sufficiently well to keep them.

Mr. C. E. Low.—*Q*. I understand your firm has had a great deal of experience in the supply of small power and pumping plants to cultivators and small industrialists?—*A*. Yes, that is so.

Q. Roughly, how many of your plants are out working, do you suppose hundreds?—*A*. 700. That 700 only covers 10 years, from 1906 to 1915.

Q. That includes pumping and rice milling and ginning?—*A*. Yes.

Q. What is your custom of financing these things?—*A*. If the man is short of capital and likes to get the plant on the hire-purchase system, we accommodate him. Looked at as a whole, the system is quite a success. There are many difficulties, of course, from the commercial point of view. The difficulties are all on the financial side. We cannot collect the money in some cases.

Q. Why? Because the fellow is not getting as much out of the plant as he hoped, owing to his own bad management, or the unsuitability of the plant?—*A*. In a few cases we could say that, but in the majority of cases they do not want to pay.

Q. Then you have got to put them into court?—*A*. Yes, or seize the plant.

Q. That is provided for in the agreement?—*A*. Yes. (Witness here gave *confidential* evidence as to the number of cases in which he has to go to extremes.)

Q. Very likely the slight stimulus of a civil suit makes him part?—*A*. In the majority of cases we find that it does not do so. We get the decree but nothing else happens. He does not pay.

Sir F. H. Stewart.—*Q*. You don't regard that as very serious?—*A*. Our experience has shown that it is not very serious. We have a large number of such cases, but if we do put the screw on and send our man down, the purchaser comes to his senses. He must see that plant go away before he considers that it is time he paid.

Mr. C. E. Low.—Do you get any trouble as to the ownership of the plant? You make it over on the hire purchase system to one man, and supposing another claims it?—*A*. We try and avoid that as far as possible by never selling a hire-purchase plant to partners or to co-operative societies. In all cases where we know we have sold to anyone with partners there is invariably trouble. (Witness here gave a concrete case confidentially).

Q. Supposing you had not had this hire-purchase system, how much less business do you imagine you would have done?—*A*. That is difficult to say. The amount of business we have done in hire purchase is 7 lakhs.

Mr. A. Chatterton.—*Q*. Was there any expansion of your business when you first adopted it?—*A*. Yes. Of course we always have to remember that these small power plants were quite new to the country. It is true that the business did grow immediately we started this system.

Mr. C. E. Low.—*Q*. Had you ever done anything on the hire purchase line in this country before?—*A*. No.

Q. You probably viewed it with a certain amount of apprehension to start with?—*A*. Yes.

Q. But look at the results which you have given us; we presume that it would not be wrong to conclude that you are satisfied with it?—*A*. Quite satisfied. I don't think the return I gave you was quite fair without the statement that we made a bad mistake at the commencement and allowed oil presses to go out on this system. All these presses went into the Tindivanam district which had an exceptionally good crop that year, and the result was that people came in and bought these presses on the hire-purchase system, took them away, used them for one season and returned the machines. Out of the 20 plants that came back, 7 were oil presses from Tindivanam.

Q. Is it possible to safeguard oneself from that kind of thing?—*A.* We try to do it by limiting the size of plant that will be sold on the hire purchase system. We don't go below Rs. 1,000, and it must be a power-driven plant.

Q. Have you any upward limit which you think should be placed on the value of the plant?—*A.* We have never run up to the maximum limit. I suppose if a plant were to cost 20 or 30 thousand rupees, we should think about it. It makes us very careful in our preliminary investigations but if the preliminary investigations were satisfactory, I don't see any reason against the plant going on the hire-purchase system.

Sir F. H. Stewart.—*Q.* What are your terms roughly?—*A.* We have three agreements; the first applies only to irrigation plants as generally required. In that case one-third is paid down and one-third at the end of one year, and one-third at the end of the next year. Then we have another one, in which one-quarter is paid down and payments of a quarter six months apart.

Q. There is the trouble and expense of collecting?—*A.* That is so; we have to have a man continually going round to see these people.

Mr. C. E. Low.—*Q.* Are there any ways in which, supposing Government wanted this to be taken up on a large scale by private firms, Government could be of any assistance?—*A.* Government have been of assistance to us in the matter. We have always insisted, during the last five or six years, that all hire-purchase work must come through the Department of Industries. We do that because we look upon the plant as ours until paid for. The Department has a man on the spot to investigate matters. We are powerless in that matter. We can send a man down to investigate the local standing of the man, but he is more or less at sea.

Q. I presume you cannot get assistance from the Government in the matter of recoveries?—*A.* We have never tried.

Q. Have you any experience of the lads who come from the Victoria Jubilee Technical Institution in Bombay,—the engineers?—*A.* No, but I mention in my written evidence the case of an application from a man who wished to be put through the works and required fifty per cent more pay than any workmen we had. He was a Victoria Jubilee man from Bombay.

Hon'ble Pandit M. M. Malaviya.—*Q.* How old is your firm?—*A.* It has been established in Madras since 1867, not the present Company; it was a private firm up to 1900.

Q. And it was reconstructed?—*A.* It was then formed into a "limited" company.

Q. Is that your main business, the supplying of these engines and plants?—*A.* No. Our business is general engineering.

Q. You suggest that this Board of Industries should consist of "mechanical, electrical and chemical engineers, and business men, all with a thorough and practical Indian experience and knowledge of conditions as they exist here." Do you contemplate that they should be paid for their services? I suppose you do.—*A.* Yes.

Q. Paid in what way, a salary, or for attendance at meetings of the Board?—*A.* Really I have not thought very much on that side of the question. My idea is that whether you have to pay, or whether you have not, you should make a point of getting the very best men available.

Q. And it would help you to get the men if you made it worth their while to attend?—*A.* I think so.

Q. So you recommend that they should be paid for each meeting they attend?—*A.* Yes.

Q. Is there not a danger that these mechanical and electrical engineers may favour the particular firms with which they may be connected?—*A.* If they are connected with the firms that is quite possible.

Q. How would you guard against it; would you take men from Government service only? Then you may not get the best men available?—*A.* That is a difficulty.

Q. Human nature is human nature; there have been cases in which engineers connected with Government have favoured particular firms. It has to be guarded against Have you any suggestion to make?—*A.* The only suggestion that I could make would be that if a man had any financial interest in the matter he simply dropped out for the time being.

Q. Or you will have to accept men in Government service?—*A.* Yes, of course, if the business men are in Government service. The whole of my point is that the men should be the very best.

Q. Would you have any Indians on the Board?—*A.* If they are the best men that could be got, certainly.

Q. You say "The Board should have power to add to their number if found desirable, and generally be vested with the highest possible powers." What kind of power do you mean—disposing of funds or making recommendations for enterprises?—*A.* I suppose it would really boil down to making recommendations, for the grant of funds. I don't suppose Government would be prepared to go further than that.

Q. You suggest that cinematographs should be used [illegible] instruction to workmen. Do you think they would be able to receive [illegible] instruction by looking at a cinematograph?—*A.* You can take a man [illegible] with a cinematograph; it is done in England at the present moment.

Q. Would that not be rather to arouse the general interest of the workmen in their work than to supply any technical knowledge?—*A.* Yes, I made that remark in connection with the class of men we now have to deal with. We have always to remember that the majority of them are illiterate, and unless they think they are enjoying themselves they don't want anything more to do with engineering after five o'clock.

Q. Suppose the lectures were delivered in the vernacular, and they were illustrated by the cinematograph, and accompanied by explanations of particular points, don't you think that would be more useful?—*A.* Yes, the point in a cinematograph is that it has an appeal apart from work.

Q. But your real need is to give a little general elementary instruction to the labourer that is the first need?—*A.* That is so.

Q. And you want to add to it a little technical knowledge of the industry to which he may be attached?—*A.* Yes.

Q. You say that your local trade schools are open only to those who are already engaged in the industry. You are in favour of opening the schools to any student who may want to receive the instruction given there?—*A.* Yes. I don't see why that proviso was made in the prospectus.

Q. It is a very unfortunate proviso and has hampered the growth of schools in more than one place. As a matter of fact, I was going on to the next question. You say, "Apart from the Anglo-Indian community, these conditions close the classes to nearly all but the best and older workmen, who neither need nor wish for practical training, as few young Hindu boys in engineering works are able to understand English, and are consequently unable to take advantage of the course offered." Do you get many boys from the Anglo-Indian community to these schools; are they attracted?—*A.* I believe there are seven out of twenty in the engineering classes.

Q. What standard of education have they received?—*A.* That varies a good deal.

Q. So there again you have not got a minimum standard of education guaranteed?—*A.* Not so far as I am aware. The Director of Industries may have it.

Q. Even in the case of Anglo-Indian boys, you say "an experiment is now being made in this direction, but it will take some years before definite results can be arrived at." You insist upon the boys passing a certain standard of education, in order that they should turn out to be better workmen?—*A.* No, I would not like to say that.

Q. You think they could get on without any education?—*A.* They could become good workmen without getting any education. They do at the present moment.

Q. As a matter of fact you will find very few Anglo-Indian boys who have not received any education?—*A.* I believe that is so.

Q. Are half the boys educated in school before coming to you, or less or more?—*A.* Really for the purpose of turning out a skilled workman, education has not got a great deal to do with it. A well-educated boy may be a frightfully bad workman, and a boy without education an excellent workman.

Q. Have you had many cases of boys who have had education?—*A.* I have had three; all three failed.

Q. They did not stay on sufficiently?—*A.* About three days was the limit.

Q. So that you cannot say you have had a fair experience of such boys?—*A.* I have had sufficient to make me doubt if they would be useful as workmen.

Q. I think you will find that other men engaged in business have told the Commission that boys who have had a grounding in elementary education have turned out to be better workmen than those who had not received such education?—*A.* Yes.

Q. Don't you find a change among the Hindu young men educated in colleges, in the matter of their aversion from manual training? Are they now more inclined to go in for manual labour than ten years ago?—*A.* The last experiment I made was four years ago, and there had been no change up to then.

Q. And you have not noticed any change since then?—*A.* No, it appears to me that the question of educated engineers entering works for the purpose of getting practical training is governed a good deal by the pay they can get. They consider it derogatory to work, but if they got quite a lot of money for doing the work, they would do it.

Q. By "a lot of money" you mean a decent salary?—*A.* Yes, but these men from the engineering college require very high wages, although they are no use to us whatever for the first four or five years.

Q. Have they been trained for the business for which you pay them? Are they civil or mechanical or electrical engineers?—*A.* Mechanical engineers. The last one I had was a mechanical engineer from Madras.

Q. And you found him not suitable?—*A.* Not suitable. I don't think it is the fault of the man. The men in Government service can draw very good pay, more than they are worth. A commercial firm is not prepared to pay them more than they are worth.

Q. What do you find the particular individual lacking in—a practical knowledge of work?—*A.* In everything that was needed. You see we look at technical education, in rather a curious way. You spend four years in getting technical education, then you go into the works for four years to lose it all again. A man with technical education is no use to a practical engineer unless he has had practical experience, and a college cannot give that.

Q. Does not a college combine practical education with theoretical teaching?—*A.* A little.

Q. Would not a man who had that grounding be better able to master his lessons quicker and better than a man who has not had that grounding?—*A.* Certainly.

Q. Supposing you had tried your experiment a little longer, don't you think the man would have proved more useful?—*A.* The trouble is the man would not stay longer, partly because of the salary paid, and because of the work. It is dirty work.

Q. Is it not all a matter of salary in the end?—*A.* To a certain extent I think it is salary, but it is not all salary. A good deal is in the view they take that Government employ is better than private employ. The two things combine to produce that result.

Q. You say here, "In view of the customs of the country" the degree of commercial honesty called for by all employers is very difficult to obtain." What customs of the country do you refer to? You are referring to these workmen, aren't you?—*A.* I am referring to the artisan class.

Q. What customs do you refer to?—*A.* My experience has been that if a workman becomes a really excellent man and becomes second in command of his particular department, he uses his position to make money out of the men who are not so high up in the works.

Q. You mean he receives illicit payments from them?—*A.* Yes.

Q. From the men who are engaged in your works?—*A.* Yes.

Q. What would be the salary of such a man you have in mind, who becomes second in position?—*A.* He would be practically the head workman and earn Rs. 2-8-0 a day.

Q. It is only in the shape of *butta* that such payments are received from those who are working under him?—*A.* Yes, it is small payments got out of people who are coming into the works new. I have had a case quite recently, in which a pattern maker was charged Rs. 40 before he could come into the place at all.

Q. How does that practice affect your business. You say, "In view of the customs of the country, the degree of commercial honesty called for by all employers is very difficult to obtain." That affects only the dealings between the second foreman and the workmen. Does it affect your business in any other respect?—*A.* No, except that it makes labour difficult to get in such cases.

Q. Aren't you able to check this by a little more salary?—*A.* We have never tried that method. The method we have tried is getting rid of the man. That is quite effective but temporary.

Q. The second is to give a better salary. That has been tried and found effective in the case of both Europeans and Indians, so you might think of that?—*A.* I will think of that.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* How many years have you been in this part of the country?—*A.* 11 years.

Q. Is your firm importing these engines from Europe, or have you any works here?—*A.* We have works here, but have not up to now built oil engines commercially.

Q. Where do you get your raw material from?—*A.* As much as we can from England. What we cannot get there we get locally.

Q. Have you any coal difficulties here?—*A.* We use very little coal.

Q. Do you think the Board of Industries and the Director of Industries will be able to stimulate Indians to go into this industry?—*A.* I am afraid I am not competent to give an opinion on that point.

Q. Do you think the Board you suggest of "mechanical, electrical and chemical engineers" would stimulate such an industry?—*A.* I could not say.

Q. The object of the Commission is to put Indians into industries, and we were to have your suggestions. Do you think that the training in an engineering college at present is insufficient?—*A.* Certainly, for mechanical engineers, but on the other hand I don't think the college lays itself out for training mechanical engineers. It is more a Civil Engineering College.

Q. Do you think if up-to-date technical colleges, on the principle of the Bombay Technical College, were started here, that the products of those colleges would be employed here?—*A.* There is not a great demand for them. There is not a large number of engineering works, but I have no doubt the local engineering people would be able to take a number of such men if they could get them.

Q. We have been to see one of the factories here, and the young boys who attend the factories are taught in English, and they say that the supervisors being European, if these boys learnt English they would be able to take instruction from them. Do you think that would be very beneficial to the boys?—*A.* I think so. I think there is a good deal of latent engineering ability among the artisan class which does not find an outlet simply because they have no education at all.

Sir D. J. Tata.—*Q.* In answer to one of the questions you said that you found that when a boy was educated he made a worse workman?—*A.* I don't think I quite put it that way.

Q. I would like you to put it in your own way. You did not think that education was any advantage; that if anything the uneducated boy made the better workman, while the educated did not?—*A.* I did not intend to convey that. The point I wished to make was that, so far as I can see, education to an artisan makes very little difference. I said that an educated man may make an extremely bad workman, and an illiterate an extremely good one.

Q. Would it not help a workman to have a certain amount of education, so as to be able to understand clearly the instructions given to him?—*A.* It would. That is one of our great difficulties here. Our foreman and assistants are Europeans, and they have difficulty in giving the men instructions in a way that they can understand. Certainly if they learnt English and learnt to read a sketch, they would be very much better from our point of view.

Q. It would not do to get your foremen to learn the vernacular?—*A.* We tried to do so and offered them more pay, but as a general rule they would not do so.

Q. I found in a factory in Madras an attempt to teach small boys English and the names of every part of the machinery they were dealing with. Don't you think that would be an advantage?—*A.* I do.

Q. Here is a case where education has served some purpose?—*A.* That is specialised education, not general education.

Q. If they are made to learn machine drawing that would be an advantage?—*A.* That is so; but I find that the uneducated youth soon learns to read drawings sufficiently well for workshop purposes. All their drawings are very simple, and it does not take a boy long to grasp it.

Q. What about intricate drawings of machinery?—*A.* They never have the opportunity of reading those; they are never put up to the young boys. I am speaking of our own work.

Q. With regard to the mechanical engineer's training in a college of technology or a technical school, you say that four or five years of this is of no use to you. But you would be glad to welcome a boy so trained if he were prepared to come and work like an ordinary workman along with the others. You would object to pay him a salary according to his own valuation?—*A.* Most certainly.

Q. But you would not mind letting him come on with his theoretical training to work as an ordinary workman. Don't you think that you could make something of that man in quicker time than you would the other?—*A.* His possibilities are much greater.

Q. So there is some advantage in giving him theoretical knowledge?—*A.* I myself was trained at home in one of the engineering colleges, and after that went into a works on 2*s.* 6*d.* a week.

Q. That is exactly what I mean. In England people get trained first of all theoretically, and then they go into learning practical work by apprenticing themselves at practically nominal wages, to learn the work. Here they cannot do so because the country is poor. The boy has had theoretical education for three or four years and begins to want to earn wages to help his own family. Probably by that time he has three or four children, so he cannot afford to work on very low workmen's wages. That is the difficulty in this country. If, after the theoretical work, he could do practical work he would make a fairly good workman?—*A.* There is not the slightest reason why he cannot get to the top of the tree.

Q. Do you know any Indians who have reached the top of the tree up to now?—*A.* No.

Q Why not? You say he can?—*A.* I don't know of any such man who has been able to face the workshop training. My experience of course is limited to Madras. I don't know anything of Bombay where these things may happen.

Mr. A. Chatterton.—*Q.* You said that you had sold some 700 engines in this part of the country. There are other engineering firms who are doing a similar class of business here. Do you know what arrangements are made so as to keep all these plants in good working order?—*A.* The Department of Industries have a scheme at work now by which the owner of the plant pays a small fee for a quarterly inspection, and in return for this small fee the supervisor of the department in that particular district goes round once a quarter nominally and inspects the engines and sends the order to the Department of Industries for the spares that are needed, giving any hints to the driver of the engine, and the Department of Industries forwards the order to whoever stocks the spares, and the man gets the spares.

Q. It is important, I suppose, that you should have a very large stock of spares?—*A.* Very important indeed.

Q. Do you think that engineering firms who are out here, and engineering firms at home sending out machinery would object to the specification of the type of machinery by a Government department, or putting it another way, do you think that they will object to the Director of Industries, acting as consulting engineer to people of the country who want help?—*A.* No, I don't think so.

Sir F. H. Stewart.—*Q.* Is your firm worked with the Department of Industries in this way?—*A.* There is no official connection between us. We think the department has been doing good work, and we consider it necessary to back them. They have helped us to a certain extent.

Q. Has the development down here led to the development of small workshops in places where machinery has begun to be used?—*A.* Yes, it has led to a large number of such works coming into existence.

Q. And gradually from being in swaddling clothes this sort of business will be able to take care of itself, is that so? Or do you think it wants very careful nursing for a long time to come?—*A.* I am inclined to think it wants careful nursing. The Hindu who is wanting to put in plant wishes for the cheapest plant he can get. A good deal depends upon the salesman selling the plant he buys. So many things enter into it. I have known a man in Madras put in a petrol engine of 15 horse-power for irrigation purposes. That money is practically thrown away on account of the running costs. If such a man went to the Director of Industries and got his views on such a matter instead of going direct to the salesman of the engine he wanted he would probably be considerably better off. I think the Hindu wants a good deal of leading yet. I don't think he is quite fit to stand on his own feet in some matters.

Q. You say with reference to Government competition, "I am of the opinion that this should be avoided wherever possible. Government cannot hope to compete fairly with locally established industries owing to the absence of financial interest and responsibility of the men in charge." Do you think that the existence of the Public Works Department Workshop in Madras has in any way interfered with the development of engineering enterprises?—*A.* Yes, I don't think there is any doubt about it.

Q. Do you think the engineering trade in Madras is sufficiently developed to enable all the work to be done by the trade, and that those workshops are no longer necessary?—*A.* That is my opinion.

WITNESS No. 236.

MR. G. L. W. O'BRIAN, *Senior Inspector of Steam-Boilers and Prime-Movers, Madras.*

WRITTEN EVIDENCE.

Mechanical engineers.

So far as question 54 is concerned, the rules framed under the several Boiler Acts enforced in India are uniform and certificates granted by the Board of Examiners in the several provinces in India are recognised througout India.

Regarding question 55, the provision of the Madras Boiler Act requiring certificated engineers to be in charge of Boilers or Prime Movers, has not as yet been enforced in regard to private mills and factories. The matter is however under consideration and I am of opinion that duly certificated engineers should be placed in charge of Boilers or Prime Movers.

In the case of Government, Municipal and District Boards, only qualified men are placed in charge in accordance with the orders of Government.

NOTE.—*Witness did not give oral evidence.*

WITNESS NO. 237.

THE MADRAS CHAMBER OF COMMERCE.

WRITTEN EVIDENCE.

Financial aid.

Q. 1.—The Chamber is of opinion that capital for untried industries, or even new enterprises in established industries, is not readily obtainable from the general public though new capital for going concerns can to a certain extent be found without serious difficulty.

Q. 5.—The Chamber is of opinion that it is not possible to generalise on the merits of the various methods suggested of granting Government aid to existing or new industries. Each case must be considered on its own merits and with reference to its particular needs.

Q. 6.—In cases where Government assistance is granted the Chamber is of opinion that Government should stipulate for some power of control, but here again it is impossible to generalise, and the particular form of control would be a question for consideration in each particular case.

Pioneer factories.

Q. 7.—The Chamber approves of the principle of establishing Government pioneer factories in order to introduce new industries and to prove whether a new industry is commercially practicable. As mentioned in the reply to question 1, capital for new nterprises is not readily obtainable and unless Government are prepared to embark on he expense of establishing factories progress in the industrial world in India will be low.

Q. 8.—Here again it is impossible to generalise as to the manner and to what xtent Government should pioneer industries. The financial aspect of the matter is mportant, as there are industries which cannot be pioneered without very large capital xpenditure on the plant requisite for working economically on a commercial scale. As general principle the State should not be put to loss when handing over pioneer factories o private companies or persons. If the business in question is a commercial success he State should be reimbursed for at least the total amount of the outlay incurred. To his general rule, however, there must be exceptions in cases where the business has chieved its success only after repeated failures incurring heavy expenses.

Q. 9 *and* 10.—The experience of the members of the Chamber is that present existing banking agencies are sufficient to meet requirements.

Q. 11 *and* 12.—Co-operative assistance may most appropriately deal with cottage nd local industries. Benefit would be derived by the co-operative purchase and use of omparatively inexpensive plant whereby Indian produce could be placed on the narket in a better condition. The use of machine decorticators for selling groundnuts s a case in point.

Q. 13.—It is difficult to say what principles should be followed to prevent Government aid competing with private enterprise but the Chamber is of opinion that great are should be taken by Government to avoid competing with or discouraging private nterprise. Ultimately the success or failure of an industry will depend mainly on rivate enterprise and this should receive every encouragement.

Q. 14.—Generally speaking the Chamber sees no reason why any limitation should be placed on Government aid to a new industry competing with an established foreign trade.

Technical aid.

Q. 15.—The Chamber has had little experience of technical aid provided by Government to industrial enterprise but understands that references made to the Forest Economist, Dehra Dun, have resulted in interesting and useful replies being received.

Q. 17 *and* 18.—The question of what restrictions and conditions should be imposed on the publications of results of researches made by Government paid experts while attached to a private business would depend on circumstances, but as a general rule the Chamber is of opinion that if the Government expert is paid by the State during the period of work for a private firm Government should be at liberty to publish the results of the researches.

Q. 22.—The Chamber is of opinion that it would be advantageous to have provision for research for special subjects in the United Kingdom in addition to the arrangements made for research in India.

Q. 25.—The Chamber is of opinion that further Government Surveys for industrial purposes in order to add to the existing knowledge of the available resources of the country, agricultural forest, mineral, etc., are desirable.

Q. 27.—The results of the surveys referred to in question 25 might be published through the different departments concerned.

Assistance in marketing products.

Q. 30 *and* 33.—The Chamber is in favour of measures being taken by Governmen to hold and to encourage industrial exhibitions, and is of opinion that such exhibition should be of a popular character. The industrial exhibition initiated by the Governmen of Madras and held in Madras during Christmas week 1915 is a case in point.

Q. 34.—The Chamber is in favour of trade representatives being appointed to represent the whole of India in Great Britain, the Colonies and foreign countries. More use, commercially, should be made of the Consular Service and commercial interests should be given a foremost place in filling appointments in Consular Agencies. Commercial reports from foreign markets could be forwarded to the Government of India for submission to the various Chambers of Commerce throughout the country.

Q. 35.—The Chamber is of opinion that temporary commissions to foreign countries, such as the present deputation to Russia and France, for special enquiries should be encouraged and would prove of commercial benefit.

Q. 36.—The Chamber does not think any advantage would be gained by the provinces in India having trade representatives in other provinces.

Q. 38.—The Chamber is of opinion that Government should make a point of purchasing in India as large a proportion of its requirements as possible. The present system of placing all orders through the India Office in London is regarded as a serious grievance.

Q. 39.—The different members of the Chamber have found no difficulty in obtaining banking facilities through existing agencies for the marketing of indigenous products in which they are interested.

Q. 40.—It is impossible to give a general opinion as to the conditions which should control the supply by Government of raw materials on favourable terms. In the case of materials constituting Government monopolies such material, if necessary for an industry, should be supplied on favourable terms, and if possible direct to the users or manufacturers and not through contractors. A case in point is the supply of tanning bark, which has been quadrupled in value due to the manipulation of the market by contractors assisted by the strong demand from the tanneries.

Official organisation

Q. 56.—The Department of Industries exists in the Madras Presidency for the development of industries, but its powers for good are seriously minimised by the constant change of personnel.

Q. 57, 58, 59, 60 *and* 61.—The Chamber is of opinion that a Department of Industries is advisable to assist in the future development of industries in the Madras Presidency. The Director of Industries should be a Member of the Indian Civil Service of status not below that of a first-grade Collector. There should also be a permanent Deputy Director in order to secure continuity of policy. The Director should associate with himself from time to time two or three persons having special knowledge of the particular subjects under investigation. The Chamber does not recommend the appointment of a permanent Advisory Board, but would prefer the Director of Industries to obtain the assistance of business men with the necessary experience as mentioned above. The persons invited to constitute the Advisory Board in regard to any particular subject should be of standing in the commercial world in order to justify Government acting on the recommendations made by the Board. The Chamber is of opinion that non-officials acting on the Advisory Board should receive a fee commensurate with the services rendered.

Q. 62.—A separate Department of Industries with power to form Advisory Boards might be established in each province with the Government Department of Commerce and Industries at the head.

Commercial intelligence.

Q. 82.—The Chamber is of opinion that the present system of collecting and distributing statistics by the Director of Statistics is satisfactory.

Q. 83.—The Chamber is of opinion that a commercial bureau under the Director-General of Commercial Intelligence, embodying reports from Consular Agencies and trade representatives abroad would be useful.

Q. 84.—The Chamber considers the present manner of conducting the Indian Trade Journal satisfactory.

Q. 87.—The issue of special monographs on industrial subjects and publications of the Forest and Geological Departments is found to be of great use by those interested and the Chamber thinks the issue of such monographs might be extended. Notice of the issue of all monographs might be submitted by the Director-General of Commercial Intelligence from time to time to all Chambers of Commerce in India.

Certificates of quality, etc.

Q. 89.—There are many articles of produce the trade in which would benefit considerably, were a system of Government certificates of purity established—bees' wax, vegetable oils, indigo and numerous other articles might be mentioned. The Chamber is of opinion that such certificates should be voluntary.

Q. 91, 92 *and* 93.—The Chamber is of opinion that active steps should be taken by Government to combat the tendency to adulterate Indian produce. Legislation appears to be desirable but the Chamber recognises that there are difficulties in the way. On the other hand unless legislation is introduced and penalties imposed it is difficult to see how the present practice can be put a stop to. Should legislation be introduced inspectors acting under powers granted by law should be of higher status than the inspectors under the Factory Acts, Boiler Acts, etc., and should be adequately remunerated. Otherwise there will be inefficiency and possibly corruption.

Q. 94.—The Chamber is of opinion that the present state of the Indian Law relating to marks and description of proprietary and other articles of trade based on "priority of user" is satisfactory.

Q. 96.—The Chamber strongly recommends the introduction of a system of registration or disclosure of partnerships. Legislation in this matter has been recommended by the Chamber for many years.

Jail competition.

Q. 109.—With reference to competition by jail industries the Chamber is of opinion that Government should take steps to prohibit jails utilising power machinery to compete with private industries. The Chamber is also of opinion that all jail manufactures should be for State purposes only and that the establishment of plant and adoption of commercial methods such as advertising, distributing of price lists to the general public etc., are reprehensible.

General.

Q. 111.—The manufacture of vegetable oils appears to be an industry for which India seems peculiarly suited on account of its resources of raw materials and labour.

THE MADRAS CHAMBER OF COMMERCE *was represented by* HON'BLE MR. GORDON FRASER *of Messrs. Best & Co., Madras.*

ORAL EVIDENCE, 30TH JANUARY 1917.

Sir F. H. Stewart.—*Q.* I understand that this note of yours represents the collective opinion of the Chamber of Commerce with which, generally speaking, you agree?—*A.* Yes.

Q. With reference to technical aid to industrial enterprises you say that references to the Forest Economist at Dehra Dun have resulted in interesting and useful replies being received and again in answer to question 40 you point out that Government might give more help in the matter of the supply of raw materials. Do you think that a case has been made out for the expansion of the Forest Department on the commercial side?—*A.* I think there is a splendid opening. The enquiries that I have sent up to Mr. Pearson have resulted in very valuable information being given to me in return.

Q. Mr. Pearson, it would appear, gets numberless enquiries from all parts of India. He is practically by himself and he finds it difficult to answer all the enquiries and get along with his own work. Do you think it would be of great advantage if his department were enlarged?—*A.* Most certainly.

Q. Would you advocate the extension of the provincial forest departments on the same lines?—*A.* I have not much experience of the Forest Department. My own enquiries have been in connection with tanning materials. I referred the matter to Mr. Pearson and got from him some very interesting information. I think there must be a big opening.

Q. You do not know what the organisation of the Forest Department in this Presidency is?—*A.* I could not tell you.

Q. We have been given to understand that there is very little movement in stocks and shares in Madras and that there is no stock exchange?—*A.* I think there is very little movement.

Q. Do you think it would help Madras industries if one were created? Do you think there is room?—*A.* I do not think there is room at present. There are two brokers who do a fair amount of business. There is a constant small business in shares going on. The business is steadily increasing.

Q. You do not think that the time is ripe for an organisation of this sort?—*A.* I have not seen the need for one.

Q. What about this deputation to Russia and France that you have referred to in your answer to question 35. Is that an official deputation by the Secretary of State?—*A.* The Secretary of State had nothing to do with it. His Excellency Lord Pentland first started the idea and it was strongly backed up by the Madras Chamber of Commerce and the Madras European firms.

Q. By the Madras Government?—*A.* Yes, the Madras Government backed up the proposal. We wrote strongly asking for a deputation and a case was put up to the Government of India and eventually two-thirds of the expenses was guaranteed by the Chamber and European firms. Then we received from the Government of India a circular saying that a deputation was going to Russia and asking whether we as merchants would like to have any questions gone into by the deputation.

Q. What were the special terms of reference?—*A.* Mr. Chadwick was an experienced man in agricultural matters and Mr. Black was well up in finance and the object was to get any information they could regarding trade between Russia and India. I could not say what the particular terms of reference were. It was a general deputation.

Q. They are then going on to France?—*A.* Yes.

Sir D. J. Tata.—*Q.* Is there any existing trade between Russia and India; by what route?—*A.* There used to be in the old days, through the Black Sea, a trade in castor seeds and oil seeds. I do not know much about the tea trade. Bees' wax is bought largely by Russia.

Sir F. H. Stewart.—*Q.* You make some remarks regarding the development of industries and you point out that one of the difficulties is the change of personnel, and at the same time you suggest that the Director of Industries should be a member of the Indian Civil Service not below the rank of a first-grade Collector. What would be the length of service of such an officer?—*A.* It would be about twenty years.

Q. You want a senior officer?—*A.* Yes. We have had three different directors in twelve months.

Q. It has been suggested to us that if you have a senior officer like that there is likely to be constant change. He may be Director of Industries for a time but he would go away as an Inspector-General of Police or a Member of the Board of Revenue or something of that sort?—*A.* I do not think it would matter if we had a permanent Deputy Director to secure continuity of policy. In order to run the department you want a senior officer. He must be a civilian of the standing of a Collector. I think he ought to be able to manage the matter all right.

Q. And what would your deputy be?—*A.* He would have to be a good man. It is rather difficult to say what class of man he should be.

Q. Would he be a business man?—*A.* He ought to be a business man and he will have to be a permanent man.

Q. These appointments, it is very difficult to fill. Have you any special suggestions in the way of building up a special service as has been done in the case of the Customs Service?—*A.* I have not thought about it. It is a big question.

Q. Supposing you could get a suitable type of men whether they are civilians or business men or men with some expert and technical knowledge, if you could get them fairly young and form them into a cadre of their own, do you think it would be a good idea?—*A.* It is an excellent idea. There will be interchange between the different provinces. It is useless to take men for two and three years. You want them for at least fifteen or twenty years.

Q. Do you think that something of that sort will work?—*A.* Most certainly.

Q. You refer to Government certificates of purity. At what stage would these come in, when the merchant buys the produce from the grower or would they come in before export?—*A.* That is a difficult point. I should say that these certificates of purity would be for the export business to be obtained by the merchant from Government when shipping the goods to the foreign buyer.

Q. Would the terms also include a stipulation that the things should be free from claims?—*A.* Buyers might in time buy on stipulation that the produce must have been certified by an analyst or surveyor appointed by Government.

Q. Would it be generally popular with shippers?—*A.* I think it would. It is very difficult to say. You have to put the scheme into actual operation before you can give a definite answer.

Q. Is it any use having those certificates voluntary?—*A.* I think you could have them so. I do not think you could very well enforce them at first. That would open out a very big question.

Q. What would be the machinery? Who would grant these certificates on behalf of the Government?—*A.* In the case of skins and hides, Government are now getting a great many of the hides and skins examined by the Government analyst for adulteration. Adulteration in skins and hides has recently increased enormously. And Government has now definitely determined to accept no hides with any trace of adulteration and those hides and skins on which the Government analyst reports unfavourably are thrown back on the merchant's hands.

Q. That is not voluntary but compulsory?—*A.* In that case, yes. The evil has increased very much.

Q. Could the certificates be granted by the Chamber of Commerce?—*A.* We would have to get a chemist and also a laboratory. We have not got those.

Q. Do you think it would form a branch of the Department of Industries?—*A.* Possibly yes.

Q. It will mean a considerable staff and it would be really confined to shipments in the principal ports in the different parts of the country. You could not have the staff all over the country?—*A.* No.

Q. Do you think it is workable?—*A.* The whole question of the adulteration of produce is a point which must receive early consideration. At present the Government analyst could do a certain amount and if chemical laboratories and institutions of that kind were established in the country, they also could do a certain amount of testing. The Government analyst has not at present the time and the staff to take up the whole trade, as he is situated at present.

Q. With reference to question 96 you say that your Chamber strongly recommends the introduction of a system of registration and disclosure of partnerships. That is an universal opinion and almost equally universal seems to be the opinion that it is hardly practicable. Have you thought out any way by which that could be done?—*A.* I do see why it cannot be done. If you legislate that partnerships must be registered then they will be registered.

Q. Have you put your views before Government?—*A.* The question has been before the Government for many years and every time it has been turned down as impracticable.

Q. You mean turned down by Government?—*A.* Yes.

Q. Did you put up a definite proposal before Government for legislation?—*A.* I do not think we did.

Q. I wish you would look up the papers in the Chamber and see whether you have put up any definite proposals before Government?—*A.* Yes.*

Q. With regard to the competition of jail industries, is the objection one of principle or does it affect business firms seriously? Does it lower prices?—*A.* I have not had personal experience. But according to the account that is given it does. If you study the price lists issued by the jails you would see that the prices are cheaper. They have cheap labour. It is also a matter of principle.

Q. With reference to banking legislation has your Chamber ever been into that subject at all as to whether special banking legislation is necessary to prevent the growth of banks which abuse the name of bank?—*A.* We put up a letter to Government supporting special banking legislation to that effect but I could not tell you what the terms were offhand.

Q. Would you mind sending a copy of your letter to the Secretary?—*A.* Certainly, I will send a copy.*

Mr. A. Chatterton.—*Q.* It has been said that one of the great difficulties in industrial development in Madras is due to the high price of fuel?—*A.* Yes.

Q. Can you tell us if anything has been done to discover new sources of coal?—*A.* Several firms have sunk considerable sums of money in prospecting for coal. My firm is one amongst others. The freight on coal is very high. It comes to about Rs. 10 per ton to rail coal down to Madras from Bengal. Except for this mining and prospecting I do not know of any other attempt to find fuel.

Q. In connection with this question of prospecting for coal, do you think that the Madras Presidency has been greatly helped by the Geological Department?—*A.* I do not think it has. I think Government is a long way behind hand in prospecting for fuel, or any minerals in Southern India.

Q. If I remember rightly there was an attempt some years ago to make deep borings? Do you know anything about it?—*A.* We sunk deep borings ourselves. We were prospecting near Arkonam, and went down to 1,000 feet. Considerable sums of money were lost and we gave up the venture.

Q. Was it done with the advice of the Geological Department?—*A.* Perfectly independently as far as I remember. It was about fifteen or eighteen years ago.

Q. Had you any consultation with them at all?—*A.* The whole thing was done between Messrs. Bird & Co. and ourselves. We depended on them for technical advice. We also prospected again in the Gōdāvari valley with no result.

Q. Was it done in each case without any help from the Geological Department? Was it difficult to get the Geological Survey to come down here? Was any application made?—*A.* I do not remember. My impression is that no assistance of any sort was rendered by Government.

Q. Do you think that the mineral deposits in the south of India have been adequately dealt with by the Geological Survey?—*A.* I do not think they have. I think that one of the very first things that should be done from an industrial point of view in Southern India is a complete survey of the whole country. The question of the fuel supply is one on which the whole development of industry depends. While prospecting ventures in that direction have not been successful it has not been proved that the supplies of fuel do not exist. A careful survey should be made by Government.

Q. Do you think that the staff of the Geological Survey should be considerably strengthened so as to enable it to deal more thoroughly with the Southern India problems than has hitherto been the case?—*A.* I think it is essential that it should. And failing that the attention of Government ought to be turned to power schemes.

Q. In the south of India we are more dependent on liquid fuel for the purposes of generating power than in other parts of India nearer the coal fields. Are there any regulations by the Government of India which appear to you to interfere with this development in any way?—Not to my knowledge.

Q. In regard to the leather industry as one of the most important industries in this part of India, do you think that the action taken by the Government has been adequate to deal with the development of this industry?—*A.* I have not had much personal experience of the affair until recently. Do you mean in regard to the leather school.

Q. In regard to the development of the industry generally? One form of it is the creation of a leather school?—There is also the question of chrome tanning. I have not had much experience of that.

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* See supplementary note printed after oral evidence.

Q. The Madras tanning trade is a very big one and at the same time in other parts of India there is a very large export of raw material in the shape of hides and skins. Do you know whether there is a very large importation of hides from other parts of India to Madras?—*A*. Yes.

Q. Do you think that the industry is capable of any very extensive development down here?—*A*. I do.

Q. Putting Madras against the Calcutta districts do you think that this is a more favourable area in which to develop the leather industry than Calcutta?—*A*. I cannot say that.

Q. I mean with reference to the supply of tanning materials and the supply of trained labour?—*A*. In this respect we have trained labour but I have never understood why raw hides should come to Madras from Cawnpore, Calcutta and other places, instead of being tanned there.

Q. It is due to the fact that there is here suitable labour which cannot be got in those places. I want to know if this is a factor of sufficient importance?—*A*. I am afraid I cannot say.

Sir F. H. Stewart.—*Q*. Cannot you make a comparison? Is there room here for development?—*A*. There is ample room for development here, and it is a fact that we do get here a large supply of our hides from Calcutta and from the northern districts and even from Burma.

Mr. A. Chatterton.—*Q*. It is understood that the Government of Madras have recently made some arrangements for experimental work in connection with the development of the trade in oil extracted from locally grown oil-seeds. Can you tell us what the arrangements are?—*A*. Government are, I understand, getting out a large modern up-to-date plant for pressing oil. I think it is no use starting an oil industry unless you are going to make full use of the bye-products.

Q. What do you mean by the bye-products?—*A*. I am not an expert and cannot give you detailed particulars. I think there is a good number.

Q. What is the Government going to do?—*A*. I have been in communication with Government on the subject. One of their difficulties was that when they had invested the capital in buying the plant they would still be called upon for a large capital for working the oil mill. I had a talk about this. I undertook to keep the mill going for three years providing the raw material myself paying a fair charge for cost of crushing and taking up the products, my intention being to work the crushing mill on ground-nut kernels. I have mentioned the matter in Council and I said that in return I expected a three years' option of purchase of the machinery. By this arrangement Government could carry out the experiment for three years free of cost except for the initial expenditure, and I in return took the risk of the business, with a three years' option of purchase of the plant at cost price less a certain fixed amount for depreciation.

Q. Is that agreement still binding on Government?—*A*. I presume so, it was never put down as a formal agreement. I hear however that the Government are thinking of sending the plant to Bangalore.

Q. When was it ordered?—*A*. It was ordered before the war. The whole scheme is held up until the completion of delivery of the plant.

Q. What is your object in taking over the products of this plant?—*A*. My own opinion is that there is a very big opening for the development of the crushing of oil-seeds in India and I was quite ready to take the risk of supplying the oil seeds, taking over the oil and the cake.

Q. The idea was to experiment?—*A*. It was a very good opportunity for me to experiment without putting in any big outlay in capital. Government on the other hand by passing on the risk of working to me would be limiting their risk to the purchase of the plant.

Q. Is there any cooperage in Madras?—*A*. Yes, but very inferior. That has been shown by our shipments of oil during the last ten or twelve months. We have shipped a considerable quantity of oil with a view to develop the industry both in castor oil and ground-nut oil. We have lost anything between 10 to 30 per cent due to bad cooperage.

Q. What casks do you use?—*A*. Cochin casks and local casks.

Q. Manufactured locally?—*A*. Imported ones. Some were good and others were bad.

Q. Is there any cooperage on the west coast?—*A*. Yes. We have gone to one of the west coast firms and they are sending us new casks and they are sending men to train our men. The result is an improvement. They arrived only three weeks ago. They are teaching our men. It is all done by the hand.

Q. Are they using the local timbers?—*A*. The timber comes from the west coast. It is not local timber.

Q. They are sending the timber to Madras from the west coast?—*A*. I think the quality of the wood is very superior, if I am not mistaken.

Q. Something seems possible on a tolerably big scale with the enormous exports of various kinds of oil seeds. Have you gone into the question of the market for cake? Has the demand for it for manure developed lately in the south of India and the rest of India generally?—*A.* I think there is always sure to be a very big market for cake.

Q. Is that supplied from the south of India?—*A.* A large quantity of oil cake is shipped from Southern India. Germany used to be a large buyer of ground-nut cake. If we could get the cake free of adulteration there would be no difficulty in finding buyers. The objection to buying Madras cake is its liability to adulteration.

Q. In connection with your answer to question 40 you say that tanning bark has been quadrupled in value due to the manipulation of the market by the contractors. Does practically all the supply of tanning material come from the Forest Department?—*A.* I think it is a monopoly.

Q. Are there any supplies in private hands?—*A.* Not that I know of.

Q. Not on any extensive scale?—*A.* No.

Q. Is there any agreement among the contractors?—*A.* I think it is due to that. Perhaps manipulation is not the right word. The contractors naturally take advantage of the strong demand and the shortage of supply to raise prices. It is also partly due to wagon difficulties.

Q. In answer to questions 9 and 10 you say that the banking facilities are sufficient to meet requirements. It has been stated that there is a great deal of trouble in transporting money from one part of the Presidency to another? Is this not due to insufficiency of banking facilities?—*A.* There is room for improvement in that respect certainly. I was looking at it from the broader point of view of getting financial facilities from the banks. So far as the moving of money up-country is concerned I think there is room for improvement.

Q. There is also great need for getting money for commercial enterprises instead of having the money locked up by individuals?—*A.* I agree. My own experience is in connection with the Madras Indian merchants. There is a very strong tendency to lock up their money in land and never to have any liquid assets. Immediately they have money, it is spent on a house or put into land. They do not keep it as a liquid asset nor is it as a rule invested in industries. I have experience of a number of dubashes. Only one I know ever showed any tendency to put money in industrial work.

Q. Why is it that the wealthier middle class people of India are reluctant to put their money in industrial enterprises which have been proved successes? There is very little buying and selling of shares in Madras. Do you think that the formation of industrial trust companies under fairly competent management would induce people to come forward and invest their money?—*A.* I am only answering for Madras. I do not know of any other Presidency.

Q. Do you think that industrial trust companies would induce people to put their money into industrial ventures?—*A.* I do not think so. I think it is due to the conservative instincts of the people. I think it will go away in time. I really could not say that an industrial trust would bring money from the people. If I wanted money for an industry I am perfectly sure that if I spoke to some of the Indians and told them that I was floating the concern they would readily put their money into it. At present a great deal of the trouble is due to the fact that they really do not go into the question.

Q. What I want to find out is the method by which people could be induced to look upon industrial concerns as a means of investment?—*A.* They do not at the present time. Whether the industrial trust would do it I would not like to say.

Q. In answer to question 25 you say that further Government surveys are necessary. What type of survey do you want?—*A.* Government might publish a number of monographs on various subjects. I might refer to the tannery which we bought the other day. We immediately looked up any Government pamphlets on tanning that we could find with a view to studying any questions relating to the industry.

Q. There are a number of surveys which have been made. Do you think it would be a good thing if they were brought up to date?—*A.* I think it would be an excellent thing to do. I am only speaking generally here. The surveys that we have had are very useful and I think that the system ought to be extended.

Q. Speaking about the Advisory Board for the Director of Industries you say that non-officials acting on the Advisory Board should receive a fee commensurate with the services rendered and again you say that the Director should associate with himself two or three men having special knowledge of the subject under investigation. Do you mean that non-officials should receive fees?—*A.* Yes. I do because I am not myself in favour of honorary work of this kind. If you pay fees and put the matter on a business basis you will get more work done. You may give a fee to the expert whom you engage and he is bound to give you good value.

Q. How are you going to estimate the value of the services rendered?—*A.* I am not prepared to say how much should be paid and in what form. An expert or adviser should be paid a fair sum for the work he does. If I am invited to take part in an arbitration or survey I am paid a fee for my services.

Q. Don't you think it would be better if a certain number of men were appointed by Government to be advisors to the Directors of Industries from time to time and they got a definite fee from Government?—*A.* That ought to work satisfactorily. You would allow that Advisory Board to call in expert knowledge and pay for it.

Q. How many people would you have on it?—*A.* I should not have many. Perhaps, three, four or five would do and the President would be the Director of Industries.

Sir D. J. Tata.—*Q.* In answer to questions 17 and 18 you say that if the Government expert is paid by the State during the period of work for a private firm, Government should be at liberty to publish the results of his researches. At what stage should the results be made known to the public?—*A.* That is rather difficult to say.

Q. Supposing that a Government expert makes researches on a certain subject, don't you think his results should be the property of the people?—*A.* There is a lot to be said on both sides. What I said was that if the expert were paid by Government, then Government should be at liberty to publish the results of the researches. If it is paid for by a private firm, then the firm will have a prior claim to the results obtained.

Q. In the latter case how long should the private firm have the benefit of the researches?—*A.* I could not say. You will have to treat each case on its own merits. I think the firm has a right to the knowledge for a certain period.

Q. And after that it should be published?—*A.* Yes.

Q. I ask you that because I happened to come across an article in an American magazine referring to a bureau of research where the rule seems to be that if a member of the staff is called upon to carry out research work for a private firm, the result of the research is made the private property of the firm employing the expert for a limited period and then it is published to the world and anybody may get the benefit of the expert's researches?—*A.* I agree with that.

Q. If the private firm pays for the results, then it is only fair that it should enjoy the benefits for a certain period?—*A.* I quite agree with you.

Q. You say that the Chamber does not think that any advantage would be gained by the provinces in India having trade representatives in other provinces. In this country the distances are so great. How would you meet that difficulty? The work that you may be doing in Madras may not be known at all in Calcutta. It should be to the interest of both to know what each is doing?—*A.* As regards that I agree. There should be interchange of ideas. I look upon the matter from the merchants' point of view. We have our own representatives in Calcutta and Bombay.

Q. You mean for firms having agencies?—*A.* Yes. As regards the question of industries, I think that the Directors of Industries of the different provinces should certainly work together. We have the Department of Commerce and Industry and that department might have supervision over the Provincial Departments of Commerce and Industry. I should think that this would be enough.

Q. In a vast country like India, people in one part are very ignorant of what is going on in another part. We heard a Government expert scientist in Calcutta who said that he had never heard of the Board of Scientific Advice. Don't you think that an exchange of views might be very beneficial?—*A.* I think it would meet the case if the interchange took place through the Departments of Industries.

Q. You refer to the importance of fuel in the development of industries. Do you think Government ought to help in prospecting for fuel, with a view to promote industries? You also speak of power schemes. What do you suggest should be the attitude of Government towards such schemes?—*A.* In my opinion it should be the same exactly as in the case of prospecting for coal. If the prospecting for coal is not successful, attention should be diverted to power schemes.

Q. If a private firm were trying to generate power what should the attitude of Government be?—*A.* Government should help in every possible way. Personally I think that these power schemes should be run by Government.

Q. Why should they not be in the hands of private firms?—*A.* I would welcome private enterprise. At the same time I would welcome the venture more if it were under Government.

Q. Would the Chamber welcome the idea of Government helping anybody who wanted to develop these power schemes?—*A.* I am sure they would. But I do not see where the private individual is to come forward from. The initial expenditure is so great and a lot of money must be invested before success can be achieved.

Q. We have successfully developed schemes on the Bombay side, and more money is about to be spent. With reference to capital for industrial enterprises, don't you think that everything depends upon the confidence which the public has in the persons who start the thing. And don't you think that that is the best thing to attract capital?—*A.* Certainly. We have not had the same experience down here as in Bombay and Calcutta. I am interested in many industries but mostly with my own firm's money.

Q. By putting your own money you will be able to attract outside capital?—*A.* It would, to a large extent. We would have to go to the public for money eventually.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* The experience of the members of your Chamber seems to be that the existing banking facilities are sufficient to meet all requirements. At. present the difficulties with the Presidency Banks are that they can only advance money on stocks. They cannot advance on the machinery or the building. How can that difficulty be removed. Do you think that the Presidency Act should be amended?—*A.* I do not care to express an opinion offhand.

Q. Suppose there is a factory costing 10 lakhs and I have got the capital of 10 lakhs. I want some money for carrying on the business. I cannot get the money because the Presidency banks are not allowed to undertake work of that kind by the Act as it stands at present. Unless there is some institution like the industrial bank or the industrial corporation I cannot get the advance. The condition of the Presidency is such that many people have not got the capital?—*A.* Do you mean that the capital of the proposed bank should be Government money.

Q. The Government may guarantee the interest?—*A.* In that case will you get shareholders to put in their money.

Q. That is a question to which I want an answer from you?—*A.* For myself I would not put my money in it.

Q. Even if the Government guaranteed interest?—*A.* You might put the money into bricks and mortar, and if the industries fail how is the bank going to get back its money.

Q. These banks would only advance money after taking expert advice and on the advice of the Director of Industries?—*A.* They are not infallible.

Q. In what way do you think that the industries can be developed? How are Indians going to take a larger share in the industrial development of the country?—*A.* I really cannot tell you. I take it that private capital must come forward. If you are going to float an industrial concern surely you ought to get your private capital from shareholders or subscribers for the actual bricks and mortar and the machinery.

Q. Do you think that Government should advance the money and recover it in instalments?—*A.* I am in favour of Government assistance in this respect but it is impossible to generalize.

Q. There are banks in Japan and in Germany which advance money to the different corporations on stocks. I am talking of the industrial banks?—*A.* If you have an industrial bank you may find that the shareholders object to tying up their money in bricks and machinery. It is not a liquid security.

Q. Do you mean to say that they would not put up the money even if Government guarantees the interest?—*A.* I would not go so far as that. It is a new idea and may be worth looking into. It is very difficult to express an opinion offhand.

Q. With reference to the Advisory Board you seem to think that the Board is not needed at all. You want that the Director of Industries should be a member of the Indian Civil Service of the status of a first-grade Collector and that he should associate with himself two or three men from time to time, who have special knowledge of the subject under investigation?—*A.* I think that would work satisfactorily.

Q. Suppose the different chambers have their elected and nominated members and they discuss industrial problems conjointly with the Director of Industries, don't you think that this would be a feasible arrangement?—*A.* That is the way it is done in Bombay I understand. I think it is a good scheme.

Q. We have not got a Director of Industries in Bombay but we have committees which meet every week and discuss the problems that arise from time to time. The members work without remuneration?—*A.* Remuneration is not an absolute necessity. It simply makes the matter more of a business proposition. It is not a question of rupees. It is more the feeling that you have a hold and that you are entitled to get the best out of the man you pay.

Q. Then about the Director of Industries you say that he should be a man of the Indian Civil Service. Why do you want a member of the Civil Service? Do you think he has got the capacity of a businessman?—*A.* An officer of the status of a first-grade Collector is a man of ability and I doubt if you will get the right type of man elsewhere. I do not think a businessman would quite meet the case. A lot of the work would be official. He would have to be very closely in touch with Government. He would be a sort of presiding officer. He would not go into all the details.

Q. Don't you think that such an officer would not remain long in the department and that in a short time he would leave the post on promotion?—*A.* The Chief Director would of course receive promotion and leave the department.

Q. Don't you think that we should organise the department like the Forest and Customs Service, having a staff of businessmen to go into the business side of any proposition?—*A.* I think so. But my idea is that the Director of Industries would be more like the President who would keep the workers together rather than do the details of the work himself.

Q. You say that the Chamber is of opinion that active steps should be taken by Government to combat the tendency to adulterate Indian produce. Can you give us any instance? What is the harm done and what is the chief commodity adulterated?—*A.* Practically all our produce is adulterated. I may refer to bees wax which is sometimes adulterated to the extent of 80 per cent of paraffin wax. Indigo is also adulterated.

Q. You think that Government should undertake legislation?—*A.* I am not prepared at the moment to express a definite opinion as legislation would lead to difficulties which it is impossible to foresee. It is a difficult matter to deal with, but something ought to be done. I think that the matter should be referred to the business communities and their opinions invited.

Q. Do you think that the best way would be to advise these dealers that their things would fetch better prices but for the adulteration?—*A.* It may do good but the best way would be to throw the goods on their own hands. Then they would realise the folly of adulteration.

Hon'ble Pandit M. M. Malaviya.—*Q.* You say that the experience of the members of the Chamber is that the present banking agencies are sufficient to meet all requirements. Do you think that the existing banks are sufficient for the purposes of the trade generally?—*A.* My remark was more in connection with the facilities granted by banks to commercial and industrial firms to carry on business. As for banking facilities up country I do not think that the facilities available are equal to the demand. My opinion is that the position is steadily improving and it is only a matter of time.

Q. Sir Bernard Hunter told us that there should be more banks established in this Presidency. Can you suggest any means as to how this can be done?—*A.* I am afraid I have not enough experience as a banker.

Q. You have not said anything about educational facilities of a technical and scientific kind being provided to develop the industries. Do you think that the want of scientific and technical education is hampering the growth of industries?—*A.* I think that the first thing that you want is elementary education for the coolie

Q. At present the education given is merely literary. Do you think that if manual training and elementary science were added to the course it would be a good thing?—*A.* What does strike me is that education must begin with the coolie. At present he works with very little interest and intelligence.

Q. How would you provide for it? Would you make it compulsory?—*A.* That is a big question.

Q. At any rate you are in favour of education being provided?—*A.* I am very strongly in favour of it.

Q. In regard to banking facilities do you think that if there is a College of Commerce which would impart training in banking methods, commercial geography, international law and so forth, you would be able to train the men necessary for the business side of industries?—*A.* I doubt it. We in our own office have most excellent clerks, trained entirely in our office.

Q. They may be efficient as clerks, but for the development of the business side of industries you want a higher type of men such as office managers and assistants?—*A.* They would come under the class whom we call dubashes. I have some very good Indians who have been with us for twenty years and over.

Q. Do you think that if they had received business education they would have been more useful?—*A.* It is difficult to say. If you train a man in book-keeping and things of that kind he would certainly be more useful. But the question is whether he would entertain exalted ideas about himself and feel disinclined to start at the bottom. It is no use if he wants to occupy a position of responsibility all at once. He must work with others and show that he has got the experience and the training necessary to hold a high position. If he goes into a business he must be prepared to start at the bottom of the ladder.

Q. In answer to Mr. Chatterton you said that industrial trusts are likely to attract capital. Do you think that Indian capital would be attracted?—*A.* I do not think I said so. It is a matter on which we shall have to learn by actual experience. I think that the conservative feeling is so strong that nothing short of personal effort and initiative would bring forth money from the Indian capitalist. That is my experience.

Q. But from your experience do you think that Indians are putting more and more money into business?—*A.* They do, yes.

Q. How long has your Chamber been in existence?—*A.* For about 60 or 70 years.

Q. Have you got only European merchants as members?—*A.* We have one Indian.

Q. Do you know the constitution of the South Indian Chamber of Commerce?—*A.* I have never read their articles.

Q. Do you know its members?—*A.* They are mostly Indian merchants. I know several of the members.

Q. Are they men doing business in Madras?—*A.* Yes.

Madras Chamber of Commerce.

Q. Do you think that it is a commercial body, that is representative of Indian commerce?—*A*. I do not see why it is not. I have no reason for saying that it is not. I have not seen very much of it. Some of the gentlemen I know are certainly representative of Indian commerce.

Q. From your knowledge of the Chamber would you think it just for any one to say that it is a political body?—*A*. Certainly not.

Q. From your experience can you tell us whether Indians and Europeans are willing to co-operate in business?—*A*. It is difficult to say. In my own business I have taken advantage of the co-operation of Indians. They have the local knowledge which I can never possess however long I stay here. If I want to do any business I always consult my dubashes and work with them, and we decide together what we are to do. They are not copartners with me, although they share the success or the failure of the venture.

Mr. C. E. Low.—*Q*. Do they get pay from the firm?—*A*. They are whole time employees. They are paid partly by salary and partly according to the success of the venture.

The Hon'ble Pandit M. M. Malaviya.—*Q*. Are there any firms in which Indian and European merchants are partners?—*A*. I do not know of any such firm.

Mr. C. E. Low.—*Q*. Is it your opinion that the question of this adulteration of Indian produce is a very serious thing?—*A*. Most certainly. The produce gets a bad reputation unnecessarily.

Q. And you express the opinion that a system of optional certificates would have good chances of success?—*A*. That has been put forward as a suggestion.

Q. You say that Government should make a point of purchasing in India as large a proportion of its requirements as possible. Do you mean that the indenting officer should buy locally what is now got from England through the Stores Department of the India Office?—*A*. I think that should be done.

Witness subsequently forwarded the following supplementary note.

As requested by Sir Francis Stewart I enclose herewith copy of a letter addressed by the Madras Chamber of Commerce, dated 10th October 1913, to the Chief Secretary to Government, Ootacamund, in reply to copy of a letter forwarded to us by the Government of Madras regarding the desirability of legislation in connection with the use of the term " Bank " in this country.

The copy referred to above is of a letter dated Simla, 22nd August 1913, No. 6905-6918-11 (Companies) from the Officiating Secretary to the Government of India, Department of Commerce and Industry, to the Chief Secretary to the Government of Madras.

Sir Francis Stewart also asked for information regarding any definite suggestion put forward by the Madras Chamber of Commerce in regard to the proposal to enforce registration of partnership. On looking up the old records, I find that nothing has been done since the year 1908. In 1907, in reply to a letter received from the Bengal Chamber of Commerce enclosing copy of a draft bill relating to the Registration of Partnerships, the Madras Chamber of Commerce replied on the 5th August 1907, expressing general approval of the bill and the hope that it would be passed into law as soon as possible.

I am sorry I have no record of any suggestions put forward by the Madras Chamber of Commerce to overcome the difficulties at present standing in the way of legislation. I hope, however, that Government can see their way again to consider the whole question, as some form of registration is highly desirable. Even if the registration were voluntary it would have a good effect provided the scheme were supported by the banks, and the banks insisted on certificates of registration being produced by the clients. Government could also assist by insisting on certificates of registration in their dealings with private firms.

The question, however, needs careful consideration and I think the time is ripe for the whole matter being reopened.

Copy of letter from Chamber of Commerce, Madras, to the Chief Secretary to Government, Madras, dated 10th October 1913.

I have the honour to acknowledge receipt of your letter No. 2846-C./5, enclosing copy of a communication received from the Government of India with reference to the desirability of legislation in connection with the use of the terms " Bank," " bankers ", etc., in this country.

The papers have been placed before the members of this Chamber, who are unanimous in their opinion that the terms " Bank " and " bankers " should not be permitted, except by companies registered under the Indian Companies Act. The Chamber would welcome any attempts made by Government to restrict the indiscriminate use of the above terms by individuals and firms.

With reference to paragraph 3, the Chamber is of opinion that the restriction suggested, while sound in principle, might be difficult to carry out in practice. The question of the advisability of imposing restrictions is a difficult one to decide as so much depends on the management, irrespective of any rules or restrictions that might be brought into force governing the working of a bank. The stability of a bank depends largely on the securities against which it advances funds, but legislation to place restrictions on the loan of funds, however desirable, is a subject which, in the opinion of the Chamber, requires to be approached with caution.

WITNESS No. 238.

MR. G. A. CHAMBERS, *The Chrome Leather Company, Pallavaram, Madras.*

WRITTEN EVIDENCE.

Capital.

I have so far not made any attempt to raise capital from the public, but what I have seen of the endeavours of others has convinced me that the majority of the natives of Southern India while showing enterprise in the starting of small industrial ventures are not disposed to invest in public companies promoting new enterprises.

I have always intended to eventually make a public company of my personal venture known as the Chrome Leather Company, but I was determined not to ask for public support until I had made the business a steady paying concern.

Most pioneering ventures have to pay dearly for their experience and mine was no exception. I lost nearly a lakh of rupees before the corner was turned—since then the original loss has been recovered and the business is now profitable.

We originally started with the object of chrome tanning only, but experience soon demonstrated that it was advisable to do bark tanning also; further as a consequence of some of our pioneering difficulties we were more or less compelled to also take up the manufacture of leather goods.

During the last few years several public men and writers in the press have advocated that small chrome tanneries be started in various centres in Southern India. Such men can have no practical knowledge of the business and evidently cannot have made enquiries concerning chrome tanneries in other countries. Otherwise they would have learnt that a successful chrome tannery necessitates large capital, considerable machinery, trained labour and last but not least expert knowledge and the larger the scale on which it is worked the better the prospects of financial success.

There is only a limited market for chrome tanned finished leathers in India and work on a large scale would necessarily have to be for export, but the export trade demands only the best quality leathers and these too in larger shipments than could reasonably be expected from any newly established ventures in India starting with untrained labour—if however, small concerns say with a minimum capital of two lakhs were to specialize in the production of chrome tanned black box sides, such concerns would I consider have good prospects of success provided that in addition to the expected export duty on raw hides made in the general tanning interests of the Empire, the Government of India gives a small bounty on the export of such finished leathers. Prospects of early success would I think be materially increased if it could be arranged that the product of such tanneries be sent to a central agency in London, where the finished leathers could be assorted and classified to meet the requirements of the trade. Such collection and standardization would doubtless considerably facilitate sales and improve selling prices for otherwise the output of these concerns would be too small in quantity and too irregular in quality, substance, etc., to realise full value from manufacturers who naturally prefer buying large lines of regular quality and even substance.

I might here mention that a large proportion of the raw hides shipped from India to Germany formerly reached England as chrome tanned black box calf or sides.

Financial aid.

I think that in the early years of the establishment of an industry Government might well render financial assistance to such sound industrial ventures as could give security and show reasonable prospects of success and such loans I suggest might be given through Presidency Banks at a reasonable rate of interest, say a flat rate of 4 per cent; but I consider that if an industrial venture shows a 10 per cent profit for two years in succession and future prospects are satisfactory the industry might be well considered established and further Government pecuniary aid should then be stopped as on such a record further capital should if necessary be obtainable from the public.

I have had no experience of financial aid from Government, on the contrary I have unfortunately only just recently suffered from its absence when help might reasonably have been expected.

On the strength of assurances given me by the Director of Army Clothing I was induced to extend my works, make considerable additions to my machinery and power, collect labour and find living accommodation for same, import materials, increase my purchases of hides—in short I incurred an expenditure of four to five lakhs of *rupees consequently, about seven months ago I asked for an advance of two lakhs of rupees from Government on account of supplies to be delivered. I offered separate security and my request was passed on to the Financial Secretary supported by the Director of Army Clothing, but I have never received any advance and although apart from leather supplies we are now manufacturing leather goods for Government (mostly equipment) to the monthly average value of about Rs. 75,000, not a rupee is received until some time after the goods have been delivered.*

Lack of Government departmental assistance.—As further instances of the lack of that assistance which might reasonably have been expected from Government departments I cite the following:—

(1) *Land revenue.*—We required a few acres of absolutely barren waste land adjoining our tannery for the purpose of erecting thereon bungalows for our employees—the correspondence on the subject has now extended over two years. It took about eighteen months to get a reply to our original application and we were then informed that the land had been allotted for grazing purposes. There is not and never will be sufficient shrub or grass on it to feed a goat or sheep.

In such a case as this, I am most strongly of opinion that before the refusal of a request is given to an industrial venture the Government departments concerned should consult with the Director of Industries and if reasonably possible, departure from the ordinary red tape regulations should be made in favour of the industrial concern.

With regard to land privately owned, but required for the establishment or extension of an industrial enterprise I think it would be best if the matter could be arbitrated upon by a Member of the Board of Industries and the landowners' representative who would themselves appoint an Umpire and the arbitration award should be legally enforceable.

I instance a case in point. The owner of some ordinary agricultural land adjacent to our tannery has demanded of us about ten times its real land value knowing that we desired to purchase, with a view to possible future extensions and for immediate use as a recreation ground for our employees; needless to say we have not purchased.

(2) *District Board.*—Our tannery and works face a public road joining up the southern trunk road with Tiruneerumalai—the distance from the main road to our works being slightly over a furlong. We requested the District Board to make the road suitable for carrying our traffic, but the request was declined and we had to make the road ourselves at our own expense.

(3) *Police.*—When we originally commenced building operations at our present tannery and had not had sufficient time to erect walls or fences to protect the large quantity of machinery, stores, etc., transferred from our former works at Tondiarpet, we asked for police protection and offered to pay the salaries of the police and find them living accommodation—our request was however refused.

Since then our works have been considerably enlarged and adjacent thereto we have erected about three hundred dwellings, for the accommodation of a portion of our employees among whom unfortunately at times quarrels arise—as a result of these we have recently renewed our former request for police assistance on similar terms—we hope however to be more successful this time.

(4) *Abkari.*—Some of the disturbances above referred to were directly traceable to the fact of some employees drinking at a toddy shop which had been permitted to be erected nearby our village. We petitioned for the removal of the toddy shop and we were personally promised that it would be removed within a few days, but as a matter of fact the place was allowed to continue until the license expired, i.e., some months later.

(5) *Post.*—The Pallavaram Post and Telegraph office is situated about three miles from our works and like most small Post offices it has only short working hours—in spite of the fact of our having been compelled through Postal difficulties to transfer to Madras a large portion of such of our business as entailed Postal work (added to which we are daily compelled to send our evening mails to Madras) yet the balance of our post still constitutes the major portion of the work of the Pallavaram Post office. We made application about a year ago that a Post office be located adjacent to our works and we offered to provide the necessary accommodation, but right up to date we are without it and are daily much inconvenienced.

With regard to the various suggested means of assisting industries. I would approve of each of the methods named but the most suitable would of necessity have to be determined by the circumstances of the case.

I would not approve of Government control of assisted business—proper security, the audit of accounts and occasional inspection of works should I consider be sufficient.

I hold strong views against Government pioneering factories—demonstrations and instruction should I think be restricted to Government technical schools.

My experiences with the Madras Government Chrome Leather Tannery and Factory were unfavourable. Their efforts resulted in competition for trade, reductions in prices and disputes regarding labour.

Had the Madras Government responded to my request for assistance in 1901 I am of opinion that the chrome tanning industry might have been established in this country some years earlier than was the case.

I advocate Government assistance to private enterprise, but should the authorities have good reason to believe that an entirely new industry would be likely to be profitable in a given place then I would suggest that before taking any Government action, notices be published that failing any indication of movement in the industry being made by private enterprise within six months from the date of notice then the Government itself would take action; but I am most certainly of opinion that any such pioneer factory should be run entirely on commercial lines, every service rendered to it by any Government official or department should be chargeable to its working expenses—as unless it can be arranged to run the business on such lines as an ordinary private individual would have to run it then its value as a commercial demonstration would be next to useless; furthermore any such factories should I think not be handed over to private individuals but be converted into public limited liability companies and shares offered to the general public as soon as possible after it has been proved to be a commercial success, but say, not later than after working for two years at a profit.

I would not show any consideration for established external trade. The establishment of industries in this country would surely bring general benefit to the people and increase their purchasing power and thus indirectly also benefit the import trade.

Technical aid.

As far as the Madras Leather Trades School is concerned I think, if properly run, it should be a valuable aid to the tanners of this Presidency. It should be equipped with a laboratory and have a thoroughly practical man at its head with an assistant qualified to teach in the vernacular. Its teaching should certainly not be confined to a few students possessing educational qualifications and mostly from other parts of India.

The present system of education in my opinion produces but very few men who will really work in the leather trade—the bulk of the would be students are men anticipating Government appointments or seeking fresh educational certificates—such men generally consider manual labour as degrading.

I consider the school should be an institution to which every tanner and tannery employee might have recource for technical instruction and advice. I would suggest that classes for employees be held on Saturdays and Sundays. Analyses should be made for the trade at nominal fees.

The school should I think as far as possible work in conjunction with the Forest Department making analyses and carrying out experiments with the various tanning materials, oil-seeds, etc., obtainable in India—there is an almost unlimited field for work in this direction.

Tannins are abundant in India, but only a few are used and many are but very little known.

Chiefly owing to the lack of organization in collecting, etc., supplies have been insufficient to meet the strong demand during the past two years and bark prices have risen considerably. If special attention were given to the subject there would be an ample supply at reasonable prices to meet all demands from Indian tanners and there would also be available considerable supplies for export preferably in the shape of extracts.

The Forest Department and the leather trade should be kept informed of the information obtained at the school. I would suggest that the Forest Department might with advantage plant up areas with Divi-divi which is a valuable tanning material easily grown in this country and for which there is a ready market for large quantities.

Divi divi is a difficult tanning material to use and the tanners of India and England have hitherto avoided it prior to the war; practically the whole of the export from this country went to Germany. We have however, now overcome the difficulties of its use at our tannery and are ourselves open to purchase at a profitable rate to the grower the whole of the Divi divi obtainable in this country.

I am also of opinion that Cassia Auriculata could be obtained in much larger quantities if the Forest Department were to give the matter special attention.

Chrome tanning materials should also be obtainable in this country. It is well known that there are large deposits of chrome ore in Mysore; I would suggest that experiments be made with a view to the possibility of treating same both for use of tanners in this country and for export. There would be a large demand for export and we would not then as now be dependent on America for supplies.

Assistance in marketing products.

I think the idea of commercial museums is good and every effort should be made to popularize their use. We have an exhibit in the Calcutta museum, but so far it has not resulted in many enquiries. The museum there, I think, is too small and too badly lighted and evidently it is not much visited by those to whom it should be of most benefit.

I consider it essential that such museums should have ample accommodations and good light for showing samples and be centrally situated. I would suggest that one be established in Bombay and the establishment of another in Colombo be suggested to the Ceylon Government. I am particularly in favour of the latter for the reason that so many travellers from all parts of the world would be likely to visit the place and thus have easy facilities of obtaining a fair knowledge as to what manufactured goods are obtainable in India. Such museums well and actively managed should I consider be of greater value to manufacturers than industrial exhibitions which generally speaking have but a brief life.

I think it would be sufficient if the Government Departments were to periodically publish a list of such articles as they are importing.

Government patronage.

I am most strongly of the opinion that Government requirements should as far as possible be purchased in this country even to the extent of slightly favouring the Indian manufacturer at least for a year or two both as regards prices and finish—this latter is the greatest difficulty that manufacturers of this country have to overcome. This applies particularly to leather goods, but reasonable time for improvement in this respect should be allowed. I am also of the opinion that as far as is reasonably possible, Local Government, should conditions being equal give preference to the local manufacturers and with regard to the Government of India this feature should also receive consideration. Why for instance should the Army and Post office leather goods requirements be obtained from Northern India, if required articles of equally good quality can be had at similar costs in the South? Why too should not we in Southern India have a claim on the share of the Burma requirements, at least until such time as the goods can be manufactured there.

Jail manufactures should I consider be restricted to the needs of Government departments and they should not be permitted to compete in the open market as against the efforts of private enterprise.

Training of labour and supervision.

At present we employ about 1,100 men at our works but the industry is yet in its infancy. We hope eventually to accommodate the bulk of our employees in the village we are building nearby the works—our aim is to make it a model village; but there is yet a lot to be done. We have a day school for the children of our employees, but we have not yet made attendance compulsory, although we hope eventually to do so. We also have a night school for such of our employees as care to attend and in both cases we are sure the results are beneficial. Later on we trust Government will render us assistance in this respect.

Technical training.

Since suitable trained labour is almost unobtainable we have of necessity to train a good deal of labour in our works, but in the majority of cases we have to pay salaries to the men while they are learning—their outturn is naturally small and they spoil a certain amount of material, so that each trained man represents an outlay to us, but unfortunately we have no hold on such men and it happens frequently that these men are enticed away to distant places and we are helpless to prevent their going or to recover any of our outlay from them. I would be glad if anything could be done to remedy this situation.

I think that there should be a Director of Industries for each Province with an Advisory Board composed of representatives interested in industries. I would favour the appointment of an Indian Civilian as Director of Industries provided he be possessed of good business qualifications and hold the appointment as a permanency, say subject to confirmation after one year's service.

Adulteration.

I am most strongly in favour of legislation against adulteration.

Branding and flaying of hides.—Many lakhs of rupees are annually lost in Southern India in the value of tanned hide exports through the pernicious practice of excessive branding. The custom is almost non-existent in Northern India and steps should I think be taken to limit the evil here. In certain districts the value of hides is considerably depreciated through bad flaying and this might easily be prevented if action were taken by the authorities controlling slaughter-houses.

Trade marks.

To the best of my knowledge it is only possible to register a trade mark with the Chamber of Commerce and I believe the only legal value of this is the evidence as to date of registration. There should I think be one centre for the proper registration of trade marks without whose registration no trade marks should be permitted.

Trade names.

I think there should be legislation to prevent the pirating of trade names. At present it is possible for any small concern to pirate the name of a larger and more successful competitor.

Registration of partnerships.

I am most strongly in favour of the disclosure of partnership. At present it is in many cases impossible to obtain definite information as to the partnership interests in many Indian concerns.

Railway freights.

The extension of our business in Northern India is considerably handicapped by high railway freights, long delays, and also by thefts on railways.

Waterways.

I am of the opinion that all waterways could be kept in good order and their use encouraged.

Shipping freights.

Madras is not a freight free port. In my opinion exporters suffer owing to the existence of a conference ring which keeps up freight rates. A merchant is prevented from shipping by any outside steamer, except he cares to suffer the loss of 10 per cent on the freight of his previous six months' shipments. In times past in their attempts to bring down freight rates here shipments have had to be made via Bombay and Pondicherry, etc.

In conclusion I venture to say that I consider it of the first importance that Government should revolutionize the working methods of its departments. It should not as now take any period up to two years to get a reply to a communication and any time up to a week for a letter to get despatched from a Government office.

Government departmental staffs are notoriously large, unwieldly and slow; why cannot they be reduced in number and be made more efficient? Why too should men in positions of responsibility be paid such low salaries as to cause them to be open to temptation.

Of what use too is all the talk of Government assistance to industries if it mostly ends in talk? Government as a body has for years past repeatedly expressed its desire to assist industries, but yet through its departmental system it has on the contrary done a great deal to stifle individual enterprise. There are many Government officials whose personal endeavours I gladly recognize and greatly appreciate but in most cases their efforts are unfortunately in vain, for they form but parts of the huge Government machine which moves exceedingly slow and whose pace they are themselves unable to exceed or accelerate.

I would urge the necessity of prompt justice, adequate punishment of offenders and quicker legal decisions.

Every businessman who has lived long in this country knows by experience that if he has trouble it is better for him to do everything possible to avoid recource to the Police or Law Courts as it almost invariably means time and money wasted. Should he as it rarely happens succeed in obtaining a conviction for theft the punishment inflicted is generally so trivial as to be no deterrent to other employees and in the case of recovery of debts, by the time one gets a decree either the debtor or his property or most probably both have vanished.

If as I have every reason to believe there is sincerity in the desires of Government to encourage industrialism then most certainly its efforts should start in the schools.

Respect for the dignity of labour should be encouraged but it would be useless to preach respect if Government does not practise it.

At present social prestige and Government recognitions are largely the privileges of the professions,—is it therefore to be wondered that the professions are overcrowded while there is a dearth of educated workers?

The average parent in Southern India generally prefers that his son should have the prospects of a respected career as a vakil or a minor Government official or servant rather than he should soil both his hands and his social prospects by becoming an industrialist. This is one of the root causes of the insufficiency of educated workers and enterprise in this part of India.

Give efficient Government, encourage technical education give reasonable sympathetic and prompt assistance to the industrialist, encourage respect for him and his efforts and there will then I feel sure be no lack of private enterprise and no need for Government to depart from its legitimate duties of Government.

ORAL EVIDENCE, 30TH JANUARY 1917.

Sir F. H. Stewart.—*Q.* You make certain proposals with reference to the development of chrome tanning in India and elsewhere; is the market for chrome tanned finished leather growing in India?—*A.* Yes, but at the best it can never be very large.

Q. Why do you say that?—*A.* Because there is a limit to the requirements for manufactured leather goods in this country.

Q. There is no reason why the demand should not grow enormously in time, is there?—*A.* There is but a limited import; and even allowing that there were no imports of boots and shoes, even then it would not mean a very great increase in the demand for finished leathers.

Mr. A. Chatterton.—*Q.* There is a big market for chrome leather of cheap chrome for sandals?—*A.* Moderately large. You will never get good chrome tanned finished leathers made into sandals; common chrome tanned leather, yes. But in Madras there is always a large quantity of pieces of bark tanned leather obtainable which are made into sandals. I do not think chrome tanning for sandals would be a profitable business.

Sir F. H. Stewart.—*Q.* In that connection you look more to the export trade, and you make certain suggestions with reference to an agency in London. Would that be a private agency to be formed by those in the trade?—*A.* It could be either private or official.

Q. You think that would have a marked effect, and prevent the trade relapsing into German hands in future?—*A.* The chief object of such an agency would be to make parcels of finished leather attractive to the manufacturers.

Q. That cannot be done adequately here?—*A.* Today, there are in India three tanneries producing chrome tanned black box, Berhampur, Bangalore and ourselves. It would never be convenient for Berhampur to send their leather down here to be classified. Their output by itself would not be sufficient to attract the attention of manufacturers at home, because by the time you selected their leathers into the various grades and substances (witness was here interrupted with the following question).

Q. You mean they specialise very much at home?—*A.* Just so. Take glace kid; you will probably get 40 varieties in sizes, substances and qualities.

Q. Would you tell us very shortly the history of your applications to Government for financial or other assistance? You applied first in 1901?—*A.* In 1901 I first wrote to Government.

Q. And in what form did you ask for assistance then?—*A.* I wrote asking whether they would help me.

Q. You said you had a new industry which you thought was for the good of the country?—*A.* Yes. For some years previous I had been endeavouring to start the industry; I had in fact with that intention arranged for the education of two men in England.

Q. You got to this stage in 1901; you definitely asked for help; what answer did you get?—*A.* "Nothing doing." Then I went to a large firm here and put the whole thing up to them, but they wanted to see cut and dried profits on a pioneer industry. I had my impression, my belief, that the business would be profitable, but I could not tell them to what extent.

Q. Did you get anyone to help you?—*A.* No.

Q. And it was during the years subsequent to that that you incurred the loss of 1½ lakhs of rupees, but eventually perseverance brought you out all right; but you consider that your experience was disheartening?—*A.* My experience in connection with Government was certainly disheartening.

Q. And might have crushed what was a promising industry in the beginning?—*A.* Quite so.

Q. You refer to your labour and the efforts that you are making to give your employees some training and schooling; do you find them willing to learn?—*A.* Yes.

Q. Do your actual employees go to these night classes?—*A.* Yes.

Q. Do you teach them reading, writing and elementary arithmetic?—*A.* Yes, but nothing of a technical nature. Whatever technical education we can give them we give in the factory and tannery.

Q. Then you refer to your labour being enticed away; do you suffer much from that?—*A.* Yes, we have at times.

Q. Is your experience the same as that of the managers of jute mills, do you find your labour migrate?—*A.* A good number stay away at harvesting time.

Mr. A. Chatterton.—*Q.* Have you any market for water-bags?—*A.* A limited market. It is a very seasonal one.

Q. Are chrome leather water-bags better than bark tanned?—*A.* Certainly.

Q. In regard to this chrome tanned black box, is it necessary to establish a new central agency, or could not one of the big firms at home take it up?—*A.* Certainly, and preferably.

Q. What you really suggest is that there should be a sort of combination between the manufacturers out here?—*A.* That is so.

Q. As there are only three manufacturers, and two of them are under one control, it ought not to be very difficult to get that arrangement?—*A.* Not at present.

Q. You might get that done?—*A.* We have it in mind.

Sir F. H. Stewart.—*Q.* Would this central agency arrange for auction sales?—*A.* No, it would not be a matter of auction sales.

Mr. A. Chatterton.—*Q.* It is a question of joint shipping and allowing the people to classify the stuff at home.

Sir F. H. Stewart.—*Q.* Would it tend to help the trade developing and spreading?—*A.* The greater the demand, the better the results. When the concerns already working are doing a profitable business the more chance there is of other people coming in.

Mr. A. Chatterton.—*Q.* You think it would lead to much more rapid expansion?—*A.* I think it would considerably help.

Q. Out of the proportion of hides in India what proportion, roughly, would be suitable for this class of work; would it grow into a very important trade?—*A.* The possibilities are immense.

Q. Do you think that the Madras leather trade school should be run as a school in which the tanners are taught on a laboratory scale, or do you think it better to run it as a tannery getting a fairly large supply of raw materials sent there and returned to the tanners after being dealt with?—*A.* I don't think it necessary that the institute should work on any large scale, nor do I consider that the tanners themselves should join in the laboratory work. They themselves would not have the education for laboratory work, it would be sufficient to tell them what to do.

Q. This school is not intended to turn the ordinary workman into a trained tanner?—*A.* I think it should be.

Q. How can you do that unless you work on a full-sized scale?—*A.* Not actually to train the workmen in their various duties, but to give them some information as to the why and wherefore of certain things. There are a number of operations in connection with tanning and finishing which the average Hindu tanner assistant has no knowledge of; he does it, but he does not know why he does it.

Q. Would you admit illiterate people to the school?—*A.* There is a lot of difference between illiterate people and men of high educational qualifications. I think at present the standard is too high.

Q. You talk about the desirability of Government taking such steps as are necessary to improve the supply of raw materials. Is there any other source of tanning material available in the south of India besides Divi divi and Cassia auriculata?—*A.* Yes. There are three or four others that I know of.

Q. You want Government to undertake to ascertain the tanning value of these materials?—*A.* I certainly think it would be good.

Q. Those experiments would have to be carried out on large scale?—*A.* Not necessarily. I think they could make their experimental tests in the school.

Q. You suggest further on that steps should be taken to limit the evil in connection with the branding of hides. Have you got any practical suggestion to make? If you have, it would be most valuable?—*A.* At present I don't think anything whatever is done to prevent it. The agriculturist brands his hides for all sorts of reasons; one for sickness which has some justification at times, but it is chiefly a case of his wanting to lessen the value of the hide, so as not to make the animal worth anyone's taking. If they want to establish ownership, why should they not be able to brand cattle in the same way as they do at home.

Q. You think it would be practicable to prohibit this extensive branding that goes on?—*A.* I think if some sort of penalty were imposed, it might have some effect.

Q. Is it equally bad in all parts of the Presidency?—*A.* No.

Q. What parts do you find bad?—*A.* The worst is on the East Coast.

Q. You say that you are in favour of the disclosure of partnerships. It has been put to us that it is impracticable in some cases. In dealing with tanners, do you have any difficulty in finding out who are the people you are dealing with?—*A.* Of course we have. As a matter of fact, beyond the two or three men of a firm with which we have dealings, we don't know who are the partners; in some of the concerns, there may be 20 partners.

Q. You mean you are dealing with an undivided family?—*A.* No. They have their own system of division in shares. It may be that everyone who is buying hides for them from the districts is more or less interested in the business.

Q. Do you make formal contracts with these people?—*A.* Yes.

Q. Do they ever evade them?—*A.* Yes, they do.

Q. On the ground that the contract is not properly drawn up?—*A.* Not on that ground, but if for instance the market goes against them. The greatest disadvantage is when it comes to any law suit and you want to recover.

Sir F. H. Stewart.—*Q.* Does the contract prove good in a court of law?—*A.* You generally find that they will say that the man whom you have been dealing with and all along recognised as being the head of the business was not a partner, and you have nothing to prove that he was.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Did you start your tannery before the Government experimental tannery was started?—*A.* I should say about the same time, but although I started nearly about the same time as Government, I should say Mr. Talati from Bombay certainly started before Government did.

Q. About the Board of Industries you mention nothing; do you think that a Director of Industries and a Board of Industries will be useful? If there is a Director of Industries and a Board is established, and all applications are sent to them don't you think that they could be expeditiously disposed of?—*A.* I think it would greatly help matters.

Q. Then about the shipping freights; you sent these goods to Bombay by what? by rail?—*A.* By rail.

Q. It is a long distance and still it is cheaper to you than to ship from Madras?—*A.* Of course; it was years back, but the conditions are the same today; but I can tell you that at the time it was first done, freights here were 55 shillings and in Bombay 27*s.* 6*d.*

Sir F. H. Stewart.—*Q.* Are you referring to ocean freights?—*A.* Yes.

Q. The difficulty is really that Madras is not a terminal port?—*A.* I don't see why that should make any difference.

Q. Steamers will not come here until they are sure of getting cargo; they have got to be sure in advance?—*A.* They can be and are sure in advance but why should we be penalised for that.

Q. You have a rebate system?—*A.* Yes we get 10 per cent return on our freights payable about a year after shipment and the agreement is that if we ship by outsiders we forfeit our rebate.

Hon'ble Pandit M. M. Malaviya.—*Q.* You think that the Government should encourage the purchase of articles made in the country even to the extent of systematically favouring Indian manufacture both as regards prices and quality?—*A.* Yes.

Q. Do you think that such support for a year or two will enable the indigenous manufacturers to establish themselves?—A. Yes, I do, or at any rate to perfect his work.

Q. Would you recommend that the period should be prolonged?—A. If reasonable progress had been made.

Q. So long as the article satisfies requirements as to quality, would the matter of finish alone be one of indifference?—A. I would not make it a matter of indifference. Take boots for instance; the finish of a pair of boots does not affect its wear but its saleable value in the open market.

Q. Do you attract workmen to your model village which you are building?—A. I am of opinion that if we can make our village attractive, we shall not have any difficulty about labour.

Q. Have you made it attractive?—A. Yes; as fast as we have put up a dwelling it is occupied. If we can give accommodation we can get labour.

Q. Are your labourers living there in families?—*A.* Mostly in families; but there is also a large number of single men.

Q. But the great bulk are familied men?—*A.* Yes.

Q. Are the children attending the school in large numbers?—*A.* Yes, quite a number of them. There are many children, I should say probably half the children of the village attend the school, it may be a third. But I should like to make it more or less compulsory that they do attend.

Q. I hope you will by and by. You say that "Government departmental staffs are notoriously large, unwieldy and slow, why cannot they be reduced in number and be made more efficient? Why too should men in positions of responsibility be paid such low salaries as to cause them to be open to temptation?" What is the kind of salary which these men have?—*A.* Well, my general opinions on that subject apply to from the policeman upwards.

Q. Up to where?—*A.* I have in mind I think particularly men who have authority to pass goods as inspectors; a man who has authority to pass goods to the value of lakhs of rupees is paid a salary of Rs. 200.

Q. What salary would you suggest in his case?—*A.* I think it should be double that at least.

Q. Have you reason to think that this salary is responsible for want of fair dealing?—*A.* I very strongly think so.

Q. Have you had many cases? Is your experience based on many persons, or one or two cases only?—*A.* I believe my views are those held by every commercial man whom I know.

Q. You say that "Government as a body has for years past repeatedly expressed its desire to assist industries, but yet, through its departmental system, it has, on the contrary, done a great deal to stifle individual enterprise." What leads you to say that?—*A.* Take my own experience; with every department that I had to deal I had trouble.

Q. You don't mean to say that it stifles industrial enterprise?—*A.* Certainly I can tell you that if I had my time over again I would not do as I have done; that is the best answer I think.

Q. What kind of difficulties have you met with that leads you to make such a strong observation?—*A.* If I start I should never end.

Q. Could you not tell us the nature of them?—*A.* I will tell you two cases. Take this army boot business. When the war started I wrote suggesting that we be given work which we were able to do. Major O'Meara, who is Director of Army Clothing, came and saw me, was keen on our taking up the work, and we sent in samples. They were more or less condemned by the Inspector. Eventually, however, we were given an order for one class of boots. This was about a year ago. We took the order as a start and as we had only a small staff before, we had to get more men and had to train them, and although our original work was not very good, month by month it was improving. I ordered machinery and got fresh employees. Seven months ago I pointed out the necessity for our also having orders for other classes of boots in order to fully utilise all our leathers. Four months ago Major O'Meara saw us (witness was here interrupted by the following question).

Q. Will you tell us the result briefly?—*A.* The result is that three months ago I sent samples to the Director of Army Clothing, a fresh set of samples and a fresh set of prices. Those samples were sent on to the Army Headquarters, and I am still awaiting the result of those samples.

Q. And thereupon you draw the inference that the stifles entrprise; is that fair; are you aware of the circumstances that led them not to reply?—*A.* Assuming that my samples are not satisfactory, why should it take three months to send me a reply? I was suddenly told to " Switch off ", pending a reply. Is it reasonable that an establishment financed with 4 or 5 lakhs of rupees invested alone in that particular work should suddenly be stopped. What am I to do with my men?

Mr. C. E. Low.— *Q.* It is possible that owing to the war certain Government departments are disorganised. What about before the war; what was your experience before the war?—*A.* We never got any Government work before the war.

Hon'ble Pandit M. M. Malaviya.—*Q.* Don't you think that there may be something in the special conditions of the war that may account for this delay?—*A.* No, I can see nothing. We had offered 100,000 pairs of boots in November at various prices. We got no reply until March. We were then offered an order at about 15 per cent under our quotations; within five days and before our refusal had reached the Director of Army Clothing we received a wire withdrawing their letter and accepting our offer as made in November at our prices. A week or two later this acceptance was ignored and we were offered an order at about 10 per cent reduction. Disgusted with such treatment we withdrew our offer and closed the correspondence.

Mr. C. E. Low.—*Q.* You say there is a good deal of available labour in or near Madras for tanning; are these of any particular caste or profession?—*A.* No. I cannot say they are any particular caste; as a matter of fact I think they are mostly pariahs. There are some men who profess some kind of caste. The tannery men consider themselves slightly better than the factory men. We have their living quarters separated.

Q. There is a large number of these men doing other things than tanning; are many of them engaged in ordinary unskilled labour?—*A.* A good many of these men who have their own fields, do a little work in agriculture, especially the tannery men but not the chuckla type.

Q. Are there two types of men that you can get to work on these things, and who possibly possess a certain amount of aptitude? There are a considerable number of them who are not actually employed in tanning, as far as you know?—*A.* Tannery men and chuckla men are quite distinct.

Q. Take your tannery men?—*A.* We can get tannery men; there is a large number right throughout Southern India.

Q. The supply of labour seems to prove a matter of less difficulty here than in Calcutta?—*A.* I believe so.

Q. You have no idea as to the figures regarding the people available for this sort of work?—*A.* No, I have not. I think so long as I can make their surroundings attractive I shall have no difficulty about labour.

Q. In what point do you fancy a serious shortage of labour would be felt, if the present trade or industry were double in extent?—*A.* No, I would go far more than double it before I would find serious trouble in labour. As far as my factory labour is concerned, I would have to train it, but I am sure the available material could be had. I don't question the labour supply so long as I can give them facilities.

Q. Then as regards the supply of materials. The difficulty about material, I imagine, is that the organisation has been sufficient for your needs hitherto, but as you increase, the material is sufficient but the organisation is not sufficient?—*A.* The supply is there in the forests; it is simply whether the contractors work it or not. In some cases contracts may be given to tanners. If the market was unfavourable and it did not pay the tanner to tan, he would not work the forest to its full extent.

Q. Do you think there are considerable sources of supply which have not been yet exploited at all?—*A.* Yes, as far as India generally is concerned, and more particularly Northern India. For instance, there is good tanning material obtainable in the Chittagong districts.

Q. Do you think that facilities for extracting tannin at or near the sources of supply would improve the organisation; would bring it along quicker from the tanner's point of view?—*A.* If you put up tanning extract factories, near the sources of supply that would be a good thing.

Q. And you would save freight of course?—*A.* Yes.

Q. And it would also organise the means of working the stuff out of the forest?—*A.* Yes.

Q. Is it a very complicated or difficult business, the extraction of tanning material?—*A.* I don't think so.

Q. Do you know anything about the work of the " Esociet "?—*A.* I think we had some correspondence with them; when they first started work they sent us some dry skins. The only experience I have had with extract people in this country was with people near Calcutta. When the war started I wanted to buy myrabolam extract, but they would not sell in this country.

Q. Do you know of any other tanning extract made in this country?—*A.* No, only this myrabolam extract.

Q. If the tanning industry is to be increased here very largely, are not tanning extract factories near the forests and places here more or less a necessity?—*A.* They would be of assistance, but whether they be actual necessities would depend upon the location of the tanner, and his proximity to natural bark supplies. The tanner would get his tannins cheaper in the form of extract, if the bark had to be carried a long railway journey, but the tanners would have to be educated up to the use of extracts.

Q. You might have a firm here for tanning in Madras and an extract firm up-country?—*A.* I don't think so. I think it would be more or less necessary to run them as separate businesses.

Q. In the same interests but separate businesses?—*A.* Possibly so.

WITNESS NO. 239.

MR. T. M. DAIVASIKHAMANI ACHARI, *Secretary, Visvakarma Mahajana Conference Committee, Madras.*

WRITTEN EVIDENCE.

On behalf of the artisan community of Southern India, who rank first in point of population (total population 1,017,465) I am directed by the Visvakarma Mahajana Conference Committee to place before the Commission for their kind consideration certain important aspects of the industrial situation which affect the progress and growth of this community in particular and other industrial communities in general.

As the pioneers of important industries in carpentry, blacksmithy, brazier's work, etc., it will be admitted that this community form the industrial backbone of the country. The Commission would, therefore, grant that every encouragement should be afforded to the members of this community in order that they might equip themselves properly for the skilful and efficient solution of the various industrial problems that now await solution.

In this connection I am directed to bring to the notice of the Commission that as a result of the first and second Visvakarma Mahajana Conferences held during the past two years, two memorials were submitted to the Local Government (copies of extracts enclosed) explaining our present educational and industrial wants. As nothing further has been heard from the Local Government on the subject the Committee are not in a position to state what action has been taken by the Local Government in the matter.

It is with no small amount of satisfaction that the Committee hailed at this juncture the appointment of a Commission to enquire about the present industrial situation of the country.

Of the industries pertaining to the artisan community the blacksmith work and carpentry may be termed the *primary* industries, on the proper development of which will depend the two important industries of the Southern India, namely weaving and agriculture. The Committee are extremely pained to bring to the notice of the Commission that through sheer neglect the abovesaid primary industries are in a primitive state. The reasons for the unsatisfactory conditions of these two industries are to be found in (1) the poverty-stricken condition of the community and (2) the extremely backward state of their education. The Committee look forward very eagerly to the Commission to rectify this deplorable state of affairs, which if not attended to promptly, will damp utterly the industrial regeneration of the country.

The Committee respectfully beg to offer the following suggestions to remedy the state of affairs in this direction:—

I. The opening of industrial schools in important centres of Southern India such as, Madras, Cuddalore, Tanjore, Trichinopoly, Coimbatore, Madura, Rāmnād, Tinnevelly and Salem for imparting both general and industrial education to the boys of the artisan community with sufficient inducement in the shape of stipends. The nature of industrial education to be imparted in the school may depend upon the particular industry suited to the centre.

II Grants-in-aid or Government loans to encourage the formation of industrial concerns pertaining to the community, the conditions of the grant and the loan depending upon the nature and solidity of each particular concern.

III. Encouragement of the formation of co-operative societies by the local co-operative Registrar, who should be instructed to preach to the artisan classes the manifold advantages of co-operation. The Committee regret to note in this connection that the abovesaid officer has not taken any steps in this direction till now.

IV. Deputation of intelligent young men of the community to foreign countries to receive higher technical and industrial education, the present rules requiring collegiate education in the case of students being relaxed in favour of the artisan youths in view of their inherent and special aptitude for such training.

V. The inclusion in the commercial museums to be erected in various centres for the exhibition of the articles of Indian manufacture, the product of our important industries. In this connection the Committee beg to suggest that a directory might be prepared by each museum giving particulars as to the name of the manufacturer and the place of manufacture, etc., for the information of the general public.

VI. Issue of necessary instructions with a view to the industries pertaining to the community not being hampered by competition with articles manufactured in the several jails. It is not the intention of the Committee by the above suggestion to close the jail industries; the Committee only desire that the articles produced in the jails should neither be exposed for sale in the open market nor taken on contract by the Departments of Government, Railways, etc., so as to injuriously compete with the local handicrafts.

In concluding this representation the Committee fervently hope that the above suggestions will meet with due consideration at the hands of the Commission and necessary recommendations made for the amelioration of a neglected community on whose prosperity depend to no small extent the industrial regeneration of the country, for which purpose the present Commission has been appointed by His Most Gracious Majesty the King-Emperor of India. It is needless to add that the humble services of this Committee would be always at the disposal of the Commission for furnishing any further information on the points raised above.

Extracts from a Memorial to the Government of Madras, dated May 1915, *presented by the President, First Visvakarma Mahajana Conference, Kumbakonam (South India).*

One of the most momentous questions in connection with education of artizans is to ascertain the reasons why such a small number of Visvakarma youths pass out of the University and why such a small number receive the benefit of secondary education. The Conference after giving the matter its best consideration is of opinion that this unsatisfactory state of things is mainly due to the special difficulties and disadvantages with which the poor artizan children are confronted in secondary schools and colleges. The community as a whole is not, as supposed, prosperous and has rapidly deteriorated. The rapid decay of the indigenous arts and industries which were the hereditary occupation and mainstay of the life of the community have declined, such decline being brought about by several adverse causes, the chief among them being the replacement of the old manual labour of the community by mechanical appliances and foreign competition. Hence the artizans of the South are in too impoverished a condition to afford to give their children the benefit of an ordinary English education. To crown these misfortunes came the present war which has destroyed what remnants were left for the community of its arts and industries.

From the facts placed as above it may be clearly seen that the community with all its adverse circumstances is dying a languishing death and is not in its present condition, able to educate its children, unless some special facilities are provided by Government such as, admission of artizan youths on half fees into high schools and colleges, and establishment of night schools for day labourers. As regards the income of the various sects of the community under normal conditions, a reference to the Blue Book relating to "Technical Education in India," 1886-1904, will show as follows:—

Page 69.

Paragraph 107. *Goldsmith.*—In proportion to their skill goldsmiths earn from 4 annas to Re. 1 per day.

Paragraph 108. *Brass smiths.*—The earning of brass smiths are as follows: those doing castwork.—Skilled workman from 6 to 7 annas per day; others less in proportion to their ability. Those doing plain beaten work: skilled workman 4 to 5 annas; others in proportion.

Paragraph 109. *Carpenters and black smiths.*—Ordinary carpenters earn from 2 to 3 annas per day each man. They also receive once a year remuneration in the shape of grain for repairing agriculturists' implements. Skilled carpenters and black smiths in large towns earn higher wages.

These statements acknowledged as above by Government bear eloquent testimony to the fact that the income of the various sects is hardly sufficient to meet the bare necessaries of life and that how impossible it would be for the members of the community to educate their children, with such a scanty and uncertain income.

As regards technical education the Committee begs to point out that not a single member of the community was benefitted by the various stipends and scholarships instituted by Government up-to-date, the reason being that such stipends and scholarships are offered by Government to men who have had higher education without due regard to inherent advantages derived by hereditary occupations. The Committee while admitting that a good general education is necessary for all who would rise in their profession, on the other hand considers that an exclusively literary training is of little value to youths

Mr. T. M. Daivasikhamani Achari.

who intend to adopt industrial pursuits. The Committee acknowledges with thankfulness the praiseworthy attempts of Government to encourage the acquisition of industrial and technical education from Europe and elsewhere, for which they had endowed decent scholarships. Many students have returned after having had the necessary training but the influence for good which they were expected to exercise for the practical improvement of local industries and manufacturers with the co-operation of the local artizans has, to say the least, been imperceptible. The Committee begs leave to point out that the mistake lay in the first step taken, viz., in the selection of the students to go to foreign countries for training, from communities other than the industrial and artizan classes who possess the initial advantage of an aptitude for manual labour, born of an inherited capacity and instinctive professional skill which a University graduate of any other class despised as a derogation from his caste dignity or literary merit. In support of the above the following may be cited from the Census Report, 1911, Vol. XII, Madras, Page 196, paragraph 57:—

"For the present unsatisfactory state of affairs two reasons may be assigned. (1) The *complete disassociation of the intellectual class in the country from its industries.* Manual work of any kind was looked upon as degrading and the higher castes treated with contempt the artizans and craftsmen who carried on the industrial work of the country. * * * The standard of living began to rise, and the needs of the people could not be fully met by the primitive industrial system of the country. * * * Gradually all over the country the local artizans were made to feel the pressure of an altogether *novel competition.* * * * Some of the old industries succumbed and are never likely to be revived, but in others the artizan has managed to *struggle on,* selling his labour for a *gradually decreasing wage.* He might have met competition by improving his methods of working, *but there was no one to help him.* The educated classes were not interested in his fate, and went on their way rejoicing at the gradual decrease in the price of their domestic requirements."

The Committee respectfully affirms the accuracy of the above statement and as a remedy, prays for the early establishment of a few industrial schools in important centres of South India exclusively for training the artizan youths on modern lines so as to provide for both "theoretical" and "practical" training requisite for turning out efficient journeyman or master craftsman. As the poverty-stricken parents or guardians may not, as is generally the case, be willing to forego the additional paltry income of their youngsters through learning the trade as apprentices under their kith and kin, it is respectfully suggested that as an inducement, the children of the community found eligible for admission into these schools be given stipends of sufficient value to meet the boarding charges. The Committee further begs that in the selection of stipendiary students for foreign scholarships to acquire technological education or special industrial education pertaining to arts and industries peculiar to the caste or allied thereto, preference should, as far as possible, be given to the youths of the artizan community who had received secondary education, the rules regarding the possession of higher academic attainments should be dispensed with or relaxed as a special favour in consideration of the past and present services of the community to the Indian public at large, and the advantages accruing from their inherited capacity, instinctive industrial skill and the influence which they could exercise among their own class after such a training.

It is needless to recount the sad plight into which the local artizans and their industries have fallen. To combat with the overwhelming poverty of the class and revive the industries peculiar to the caste some capital is urgently needed. For want of a small capital, the community for years has fallen into the clutches of unmerciful capitalists and avaricious money-lenders who knowing the helpless condition of its members dictated their own terms and made payments at their leisure, sometimes such transactions ending in mere adjustment of their old accounts. To revive the industries the Committee prays for State loans on the lines of advances made to agriculturists, as this is considered to be the only way in which Government could come to the help of its members without which any amount of sympathetic advice and official investigation will not go far to bring about any substantial industrial revolution for good in South India. Therefore the Committee urges the grant of State loans for reviving their arts and industries, for well-organised co-operative societies of the community.

A copy of letter from Mr. Alfred Chatterton, C.I.E., indicating the lines on which the metal work industry of the South may be revived is appended hereto for favour of consideration along with the other points.

Extracts of the resolution, passed at the First Visvakarma Mahajana Conference, Kumbakonam, April 1915.

Industry and industrial education.—This Conference begs of Government that they would be pleased to take the necessary steps for:

(*a*) The preservation of indigenous arts and industries peculiar to the community from deterioration and extinction.

(*b*) The early establishment of industrial schools in some important centres of South India where necessary industrial education on modern lines be given to the youths of the community with necessary scholarships.

(*c*) The extension of scholarship for obtaining foreign training in industrial education to youths of the community who had received secondary education the rules regarding the possession of higher education as a condition precedent for selection be relaxed in their case.

* * * * *

(*e*) The grant of State loans by way of capital for improving methods of the indigenous industries peculiar to the caste for well-organised Co-operative societies as is the case with the agriculturists.

Extracts of the Resolutions adopted at the Second Visvakarma Mahajana Conference, April 1916.

V. Resolution —

(*a*) This Conference again prays that Government out of special regard to the poverty of the community, owing to the decay of their arts and industries brought about by powerful and unfair competition, and the present industrial dislocation and consequent poor income of the community, will be pleased to order the admission of youths of the artizan community into secondary schools and colleges on half-fees.

(*b*) This Conference of the industrialists of South India again begs of Government that they will be pleased to take the necessary steps for the early establishment of industrial schools in some select centres of South India, where necessary industrial education on improved scientific methods may be given to the youths of the community with necessary stipends.

(*c*) This Conference, while reiterating the importance of inherent advantages derived by hereditary occupation in the selection of students for receiving technical training in foreign countries, begs of Government to select youths of the Visvakarma community, who have received secondary education, the rules requiring the possession of academic distinction, being relaxed in their case.

(*d*) This Conference prays that Government will be pleased to depute the Registrar of Co-operative Societies to educate the minds of the members of the community as regards the advantages of business co-operation and the formation of co-operative societies in various centres for improving their industries.

(*e*) This Conference begs of Government to issue necessary orders to all Municipal councils to institute enquiries as to the educational needs and status of this community and to start technical and industrial schools out of municipal revenues as contemplated under sections 118, 124, of the District Municipalities Act, for the benefit of the community.

(*f*) This Conference resolves that the members of the Visvakarma community residing in municipal towns should submit memorials to their respective municipalities, requesting them to provide adequate means for promoting the general and industrial education of their children.

Copy of letter No. 2853, *dated* 24*th March* 1915, *from Alfred Chatterton, Esq., F.C.G.I., C.I.E., to the Secretaries, Visvakarma Mahajana Conference, Kumbakonam*

I am in receipt of your letter No. 95-B, of the 23rd March 1915. The metal work industry in Kumbakonam is a very important one and it is certainly time you took steps to put it on a modern footing. This means the introduction of modern metal working machinery such as is largely used in the workshops of the Indian Aluminium Company in connection with the manufacture of aluminium wares.

I am afraid it will be difficult for me to outline a practical scheme whereby you can establish in Kumbakonam a modern metal working factory. It is certain that you will require the services of expert metal workers from Europe to teach you how to apply these modern processes to the class of goods you are manufacturing. This can only be done either by establishing a factory with a large out-put and run on purely business lines or by starting with Government assistance an industrial school and dealing with the metal working industry of the town much in the same way as years ago I dealt with the aluminium industry in Madras.

Extracts from a Memorial to the Government of Madras, dated 28th August 1916, presented by the President, the Second Visvakarma Mahajana Conference, Tanjore.

Among the important topics that engaged the serious attention of the Conference were:—

(1) The revival and development of indigenous arts and industries;
(2) The encouragement and spread of education among the members of the community.

It is a fact admitted on all hands that the artizan classes represented by the Visvakarma community form the industrial back-bone of the country. It therefore follows that prompt measures should be taken by the benign Government to afford every encouragement to the members of this community, in order that they might equip themselves properly for the skilful and efficient solution of the various industrial problems that have arisen at this crisis. The Conference viewed with grave concern the present neglected condition of the indigenous arts and industries, and resolved that Government be requested to open industrial schools at various centres in the presidency, with sufficient inducement in the shape of stipends, to enable boys of the artizan classes to get themselves trained in these schools in different arts and industries, according to improved methods. The Conference also resolved that intelligent young men of the community, who have received secondary education, should be sent abroad to receive higher technical education, the present rules requiring collegiate education in the case of the candidates being relaxed in favour of these young men, in view of their special aptitude for such training.

As regards the utter deficiency of education among the members of the community, the fact that there are only eight persons who have attained academic distinction among a male population of about 3 lakhs in Southern India, speaks for itself. Though elementary and secondary education have spread among the members to a slightly higher degree, over 98 per cent of the number still remain illiterate. A community steeped in such ignorance should be considered by all fair-minded persons as backward in point of education. The Conference, while exhorting every member of the community to give at least elementary education to his children, resolved to request Government to extend to Visvakarma boys the concessions granted to members of the backward classes in the shape of scholarships, which will dissuade boys of the community from taking to their profession at a premature age, out of poverty, a tendency working injuriously towards the educational progress of the community.

A valuable suggestion which was embodied in the form of a resolution and which received the unanimous support of the Conference, was the prayer that Government should direct the several Local and Municipal bodies under their control to open technical and industrial schools within their jurisdiction, and accord necessary facilities therein to the boys of the Visvakarma community to receive education and industrial training. The Conference felt confident that this prayer would meet with a ready response at the hands of Government, as it merely involved the issue of instructions to the Municipal Councils and Local Boards to pay prompt attention to a vital branch of their work hitherto neglected.

ORAL EVIDENCE, 30TH JANUARY 1917.

NOTE.—*In the oral examination* MR. T. M. DAIVASIKHAMANI ACHARI *was accompanied by* MR. N. DURAIVELU ACHARI, *Vice-President of the Committee.*

Sir F. H Stewart.—*Q.* Is your conference a permanent body or what is it?—*A.* It is a permanent body. It was organised by the artisans of the southern districts and the population of the artisan class of Southern India is about 10 lakhs. The conference is a thoroughly representative assembly.

Q. Have you got these people organised for industrial purposes? How long has this conference committee been appointed?—*A.* Yes. The first conference was held in April 1915.

Q. That was the beginning of it?—*A.* Yes, and before that we had many associations among the community which were working for the industrial salvation as well as the educational uplifting of the community.

Q. And you wish of course to help the community as much as you can. What practical steps do you take yourselves towards that end?—*A.* The practical steps we have taken hitherto are, first, we want to give the children of the community good elementary education to start with, and wherever practicable, to give stipends and scholarships to deserving students to prosecute their studies in secondary schools and colleges, and secondly, we are preaching the advantages of co-operation in industrial matters and we give them lectures wherever it is possible, in different centres in Southern India. The practical work turned out by the conference committee is that the divergencies between the various classes have been reconciled as it were, and we have established some sort of unity among the artisans of Southern India. That is the result we have achieved hitherto.

Q. How is your committee appointed?—*A.* First of all, we have divided our districts and we established some sort of panchayats, the members of which are selected by the people themselves, and these panchayats send in their representatives to the conference as delegates and these delegates have a voice in appointing the committee.

Q. Where are your headquarters?—*A.* The headquarters are at Kumbakonam at present and there is a proposal to transfer the headquarters from Kumbakonam to Madras.

Q. Have you got funds of your own?—*A.* I am sorry that the present poverty stricken condition of our community has not enabled us to start with any big funds We have a modest sum at our disposal that is, a few hundreds.

Q. Collected amongst your community?—*A.* Yes. And the rate of subscription i only one rupee per annum and it is very difficult even to collect that sum regularly.

Q. You refer to the need for industrial classes at important centres in Southern India?—*A.* Yes.

Q. But you not only think that education should be free—that one can understand—but you think that the boys should be paid and should be given stipends—all of them —*A.* Yes. To such of the deserving boys.

Q. You don't mean as prizes?—*A.* No. I mean stipends should be paid.

Q. To go to the school?—*A.* Not to go to school, but to get the requisite industria training for the uplifting of the community.

Q. That will be an expensive matter?—*A.* You are not going to pay much. It i only a small amount which may vary from 2 to 4 rupees or at the most 6 rupees a month

Hon'ble Sir R. N. Mookerjee.—*Q.* If there are a hundred boys then they will hav to be paid 600 rupees a month?—*A.* We would not select boys indiscriminately: w would restrict our selection to deserving students. This is only for specially selecte students.

Sir F. H. Stewart. *Q.* You refer to the co-operative credit societies and you regre to note that the Registrar has not taken any steps in the direction of popularising them Is that a fair criticism? I thought a great deal was being done by him?—*A.* No. S far as our community is concerned he has done practically nothing.

Q. So far as your industrial community is concerned?—*A.* That is, so far as ou community is concerned. The artisan community is comprised of 5 classes, viz., blacksmith, carpenter, coppersmith, sculptor, master-builder and the jeweller.

Q. You are doing what you can in that direction?—*A.* Yes, we are doing something in our humble way.

Q. Is it not doubtful how far the Registrar of Co-operative Societies beyond hi official functions should also be an apostle and how far he should preach to the people?—*A.* I understand that he is preaching to the weaving community and chucklers an other people, and he may extend the same sympathy towards the artisan community considering the great advantages which would accrue thereby to the community an the country.

Q. Have you got any co-operative societies among your community now?—*A.* W wanted to start one at Kumbakonam but it proved a failure because the people wer diffident whether the Government would approve of the formation of such a society and they have now learnt that co-operative societies were started by the weaver community at the instance of the Co-operative Registrar.

Q. Because he did not come along and do something, the people were not quite sur of the support of Government?—*A.* They were not quite sure that they would hav Government support.

Q. Have you approached him in the matter?—*A.* We have sent him copies c memorials year after year in which we have complained that the Registrar of Co operative Societies has not taken any steps.

Q. Have you explained the position to him? If you explain the position to him he may be able to help you?—*A.* He may be able to help us. We shall take furthe steps in the matter.

Hon'ble Pandit M. M. Malaviya.—*Q.* Is there any co-operative society in you district at present?—*A.* No.

Q. Not even for agriculturists?—*A.* There are societies for agriculturists.

Q. And you want a society for your artisan class?—*A.* Yes.

Q. Is there any difficulty in your starting a society now, when you know how matters stand in other districts?—*A.* With the aid of co-operative Registrar and his advice.

Q. Supposing he does not come, if you send him proposals would he not sanction them?—*A.* Yes. But the presence of the co-operative Registrar will be a stimulus to the members of the community. He has gone and worked among the weaving community and the agriculturists, but he has not done anything for our community, although we have sent him copies of resolutions adopted at our conferences regretting his absence.

Q. As you now take such an interest in this matter, I suppose your members understand the value of co-operative societies and even if the Registrar is not able to come for some reason, can you not go ahead?—*A*. Yes. And we are preaching the usefulness of co-operation. At every conference we do that.

Q. It is not necessary that the Registrar should come as you know, and you might start a society with only a few members and work it up?—*A*. Yes. We can do that.

Q. There are 700 or 800 societies registered every year and the Registrar may not be able to personally inspect every one for himself and you need not wait for his visit?—*A*. Considering the numerical strength of the artisan community in Southern India and considering the fact that he is the only co-operative Registrar for the Presidency, we think we are justified in calling upon him to co-operate with us.

Q. I entirely agree with you, but suppose he is not able to come, why should you not start the business?—*A*. Our community is a backward one and in spite of our preaching, we may not succeed in forming a co-operative society.

Q. I think if you start a society with such members as may be willing to join you will find your success appreciated by others and they will join?—*A*. I suppose there will be no difficulty in Government persuading the local co-operative Registrar to assist the movement.

Q. I entirely share your hope, but I wish you to realise in this matter that it is open to you to help yourselves and as you recognise the value of co-operation you need not wait for the Registrar to come, but you may start a society yourself?—*A*. We are not going to wait, but we only appeal to Government for their co-operation.

Probably if you start a society and work it properly, the Registrar will come to see how well it is going on.

Q. Is elementary education very limited in your class?—*A*. It is very limited. I should think the literate population among our community in Southern India is 43 out of ten thousand.

Q. Is the community scattered in several districts?—*A*. It is scattered in all the districts.

Q. Don't your boys attend the ordinary elementary schools?—*A*. Yes, but very few of them. Parents send boys in their very early youth to work so that they might benefit by their wages. They don't care to send their boys to schools. That is why in one of our resolutions, while exhorting the members of our community to impart elementary education to their children, we resolved that the same concessions granted to members of the backward classes should be extended to Visvakarma boys. The parents do not realise the benefit of education.

Q. Has not your conference made any arrangement for preaching the advantages of education to your members?—*A*. We have been preaching and we are preaching in Madras now. It was only last Saturday that we preached in Mylapore.

Q. And you are going round preaching to members of your community in other districts also?—*A*. There are local committees in every district who do the same thing for us.

Q. Is there any important school or factory where instruction is imparted in carpentry, and blacksmithy in this Presidency—Government or private?—*A*. There is one in Madura and there is a missionary institution in Tanjore and we have the School of Arts here.

Q. Are many of your boys receiving instruction in these schools?—*A*. Not many In Madura a few of them, and in Tanjore practically none.

Q. You think that if industrial schools such as you suggest are started in the places you mention, the boys of your community will resort to it in large numbers?—*A*. Yes. When we mention industrial education we also mean that in those industrial schools there should be also elementary education. It should go hand in hand.

Q. Are the products of your workshops not exhibited in the Victoria Technical Institute here?—*A*. Not much. The one defect we find here is that the articles exhibited are open for sale. Our idea is that the articles should not be sold, but should be merely exhibited so that they may be a stimulus to the members of the community. As it is, when they are sold, there are no articles to replace them easily.

Q. Is not that a matter of arrangement; the articles can be replaced easily?—*A*. It is not so easy to get the articles at a short notice because industries have not developed to that extent.

Q. Are jails manufacturing much in the way of carpentry and blacksmithy and offering the goods for sale?—*A*. Yes. Just as they do in the case of carpets, etc.

Q. And by these articles they compete with your products?—*A*. Yes, they undersell us.

Q. You say, quoting from the Technical Education Report in India, that carpenters earned from 2 to 3 annas per day each man?—*A*. That is the Government Report.

Q. Is that generally the rate of wages in this part of the country for carpenters?—*A*. I mean in rural parts. In towns it is a little better. It is 7 annas in towns.

Q. What is the date of that report?—*A*. 1904.

Q. Have not wages gone up much higher during these 10 years even in villages?—*A*. No. It is stationary in villages.

Q. Is it so?—*A*. It may be a little more this way. They also receive once a year remuneration in the shape of grain for repairing agricultural implements. The skilled carpenters and blacksmiths in towns earn higher wages.

Q. Have you applied to the local and municipal boards of your town to open industrial schools such as you suggest in one of your memorials to Government?—*A*. Yes.

Q. And what answer have the boards given?—*A*. It was only at the second conference that we decided about it, and our memorials have gone to the several local boards and municipalities and we have not got any reply yet.

Q. I can only suggest that you should go ahead with your project of co-operative societies and I hope you will spread them wherever your communities are and you will prosper?—*A*. Thank you.

Mr. A. Chatterton.—*Q*. You want to start co-operative societies. What are you going to do with them?—*A*. To revive our cottage industries.

Q. What is the object with which you wish to start co-operative societies? Is it purely for credit purposes, or is it to co-operate in the marketing of your goods, or to co-operate in getting a certain kind of machine which will be useful in the manufacture of metal wares?—*A*. In getting useful machines for the manufacture of goods, and the requisite capital also.

Q. That is to say, you want small co-operative societies of workmen?—*A*. Yes.

Q. Are there not such associations already working in some places? In Kumbakonam?—*A*. Not in Kumbakonam.

Q. Have not a certain number of Acharis started together furniture making in Madras?—*A*. I am not aware of it. There is none at present working.

Q. You have brought forward some evidence to show that the wages ranged from 3 annas to 6 annas a day. Is it not a fact that at the present time, any good artisan can get good wages?—*A*. In big towns there are good wages.

Q. Is it not difficult to get good artisans to work at present?—*A*. You mean in towns?

Q. Yes.—*A*. There is no difficulty in getting carpenters or blacksmiths.

Q. I am talking of coppersmiths?—*A*. In Madras we have not many of them. We have good carpenters and blacksmiths here.

Q. Are there many coppersmiths in Kumbakonam?—*A*. Yes.

Q. And do they get any employment?—*A*. They have got their own independent work—the work of their forefathers.

Q. And they have fairly large workshops in Kumbakonam?—*A*. Not worth the name.

Q. Workshops with 10, 15 or 20 artisans working together?—*A*. Not to my knowledge. Only they have got a handful of workmen or coolies under them.

Q. Is there any Government school dealing with metal work in the whole of the Madras Presidency?—*A*. No. Not to our knowledge, unless you mean the School of Arts here which deals with the artistic side and not with the practical side.

Q. Are many of your members employed under the Nattukottai Chetties in the temple works in Madras?—*A*. They are doing metal plate works for making kavachams for the deities in the temples. Not many in Madras.

Q. Is it not through these temple works that the hereditary skill of your artisans has been maintained?—*A*. That refers purely to the artistic side of the thing, and it would not help the advancement of the community in any way at the present time.

Q. Are many of your caste men employed in the Indian Aluminium Company?—*A*. No. I wanted to ascertain the fact some years ago and sought admission into that factory, but I was refused admission and I was not able to collect that information.

Q. You do not know whether your caste men are employed there or not?—*A*. My private information is that there are not many of our men there. There are other caste men employed in large numbers there. In this connection I may invite your attention to our letter to you where we say that the same, if not more, attention should be paid to the development of the brass industry as to aluminium industry. Perhaps from your experience you will find that Kumbakonam is a very good centre for developing brass industry.

Q. As you know, several schemes have been proposed at Kumbakonam and for local reasons they have almost all failed?—*A*. But I think the time is now ripe for the development of that industry at Kumbakonam.

Q. I agree with you entirely?—*A*. Very well.

Q. Are many of your community educated?—*A*. In southern India our male population is about five lakhs, about one-fourth of which are literates.

Q. How many of you are educated like yourself, that is, have received higher education?—*A*. There are only eight graduates among a male population of five lakhs.

Q. And may I ask what you are doing? Are you carrying on the same profession?—*A*. I have just retired from Government service and I want to do some work towards the advancement of my community.

Q. You are anxious to have these co-operative societies to deal with this machinery question. Is it not a fact that the reason why the Registrar of Co-operative Credit Societies has not taken up the matter is lack of technical knowledge all round, Have you ever considered yourself what you really want to do?—*A*. Yes. All round technical knowledge is no doubt a desirable qualification. The first question that has to be attended to is the opening of industrial schools.

Q. You have a fair number of industrial schools started already—carpentry classes and blacksmith classes and so forth?—*A*. Do you mean in the Madras Presidency? For instance, if you take Madras, in the School of Arts we regret to find that only the artistic side is developed and not the practical side, that is, the commercial side of the thing, and unless the commercial side is paid attention to, I do not think there is any scope for our community to advance. I take the Victoria Technical Institute only as a museum.

Q. It is not a museum, but it is obviously a shop in which you can display the things and sell them?—*A*. If the articles are intended for sale, I should say there are many other places where our articles might be manufactured and sold to the public. My contention is that the institute under reference should be utilised as a museum. As only an instance of what industrial training can do for us, I would refer to the German brass tumblers. Now we get them from Germany in large quantities, and they could very well be manufactured in Kumbakonam and sold at much cheaper rates. I do not see why they should be got from Germany, if you have got industrial schools to teach the particular industry.

WITNESS No. 240.

MR. P. PARTHASARATHI NAYUDU, *Landlord and Mirasidar, Saidapet, Madras.*

WRITTEN EVIDENCE.

Capital.

Q. 1.—I am of opinion that to raise funds from the public is a very difficult matter, inasmuch as they cannot at the outset form an idea as to the success or otherwise of an undertaking. It is therefore absolutely necessary that Government should grant guaranteed dividends for a certain number of years so that the business may wholly or partly be under the management of the Government. It is only then that we can expect public co-operation and investment in the matter. It is impossible to secure public confidence if Government aid by money grant alone without their direct management at least for a time. After the business is found to be in thorough working order and paying at the same time, it may be handed over to any person or company either by sale or by public auction.

Government assistance.

Q. 5.—(3) When Government aid is extended to any enterprise, a fair rate of interest should be paid to them from the profits realised.

(5) Government may be pleased to undertake to supply some of the necessary materials and plant wholly or by hire-purchase system to the enterprise which they wish to encourage.

(7) Government should guarantee, say for a period of at least 20 years, to purchase the products of the factory, leaving a fair interest to the investors, although the rate may be a little higher than the foreign market.

Financing agencies.

Q. 10.—Existing or new banking agencies must be compelled by Government to assist private and new industries as far as possible.

Technical aid.

Q. 17.—When private firms or companies secure the services of Government experts, the latter should be paid their graded salaries, Government bearing a moiety of them, Their services should be retained until the staff of the factory to which they are attached get a thorough insight into the business.

Demonstration factories.

Q. 20.—For public knowledge and encouragement the establishment of some demonstration factories is essential.

Supply of raw materials.

Q. 40.—Government should aid ryots by money grants to grow raw materials for paper making on all possible soils and encourage them to supply such products to the local factories at reasonable prices. They should also lease such forests as are abundant with the materials necessary for paper and other manufactures, giving preference to factory holders.

Land policy.

Q. 42.—Concessions should be granted free or at nominal rates for the development of existing or new industries.

Training of labour.

Q. 45.—Intelligent men should be sent by Government to foreign countries where they should have the benefit of both theoretical and practical knowledge of the business concerned. I hear that many who had been to foreign countries have returned without any practical knowledge and hence they have not been a success in their respective businesses.

Industrial schools.

Q. 50.—Industrial schools are highly necessary and they must be under a separate Department of Industries fully manned by experts in several lines of industry.

Official organisation.

Q. 57.—A Board of Industries with executive powers and budgeted funds under the management of an expert Director of Industries is quite necessary. An annual conference of the various Boards of Industries should be held in each centre in rotation when an industrial exhibition may also be held and the staffs of the various enterprises be encouraged by awarding of prizes in open competition.

Industrial and trade journals.

Q. 85.—An industrial or trade journal to disseminate general information regarding all kinds of industries and trades will be of very great use. The subscription should be so low that it may be within the easy reach of all concerned.

Q. 86.—Contributions to the vernacular industrial or trade journal should be encouraged by paying according to the merit of the article contributed.

Railways.

Q. 98.—To encourage local industries, railway freights should be reduced as much as possible specially in the transit of raw materials to the factories.

Q. 99.—Railway extensions will be necessary in case factories are established in suitable and convenient centres and also in case the distance from the existing stations is great.

General.

Q. 110.—I had a paper manufactory at Kollathore near Perambur till March 1915. It was with us for the last three generations. Originally we manufactured brown paper purely from fibre flax of different varieties mixed with waste paper and produced card boards and paper of different kinds such as cartridge, chelan, demy and foolscap and supplied them to Government to the extent of about Rs. 50,000 till 1888. In 1888 when Bally Mills were started at Calcutta, they competed with us and as their paper was better than ours, the Government cancelled our contract. I then appealed to His Excellency the Governor in Council who took a sympathetic view of the matter merely to encourage the local industry, and granted us the supply of one fourth the quantity needed. This continued with some variations in the quantity till March 1915, when I had to close the factory as I could not compete with foreign made paper and boards and for the want of Government sympathy. Many of my friends advised me to start a limited company and I did not yield to their wishes as I was doubtful of its progress and success.

If a machine-made paper mill, with steam power, is to be started in the Presidency of Madras, it cannot compete with foreign made paper I am strongly of opinion that the mill should work with water power and it must be located in a place where we can have water power to turn the machines, instead of steam or oil power. Places like Periyar or Courtallum, so far as I am aware, will be best fitted to such enterprises. There will not only be water and water power but it will also be advantageous to grow grass, fibre-plants, and other raw materials on the surrounding hills and lands. Belgium and Holland firms supply the Indian market from considerably long distances at a cheaper rate than that of the Calcutta Titaghur Mills. From this I understand that the climate of those places is favourable, being cooler, and coal also is markedly cheaper there, and with other facilities perhaps they manage to supply so cheap. Here in Madras not only is coal very costly but the climatic conditions are also very unfavourable, for the machines very often get out of order on account of the tropical heat. These I think are some of the chief reasons for Indians being unable to compete with foreign markets. To manufacture a ton of paper it requires about 3 tons of coal and 5 tons of water besides the raw materials to procure which there is very great difficulty. Water and the best raw materials, the chief factors in the manufacture of a fine paper can both be solved, if the mills are located in a place where there are water facilities as I suggested before, in which case the machinery can also be worked with water power. The cost of coal and the baling of water will therefore be an entire saving.

If at all any paper mill is to be started in Madras or in any of the suburbs, I am of opinion that a hand-made paper factory may be opened in which factory superfine handmade paper, the like of which the Government now purchase from foreign countries, can be made with good profit, provided that the Government agrees to purchase it for at least 15 or 20 years. The one great difficulty is to procure raw materials. In this respect the Government should take steps to procure raw materials for a certain time at least. Thereafter, the mill owners can themselves import them directly. Without this help from the Government even hand-made paper cannot be manufactured.

If the Government promises a dividend of say at least 4 per cent and also supplies plant and other necessary materials at least partly only then will the public come forward with investments. If they cannot promise any dividend it must be purely a Government concern as a demonstration factory by way of encouraging local industry.

Let me in this connection state that I have a large building requiring some repairs within a mile distance from the Perambur Railway station, wherein a paper manufactory can be started newly. It was there that my old paper factory was located. I shall be glad to place it at the disposal of the Government free of rent, for 5 years, in case they undertake to start a demonstration factory.

I solicit the favour of an intimation in case the Government approves of my suggestion.

ORAL EVIDENCE, 30TH JANUARY 1917.

Sir F. H. Stewart.—*Q.* Do I understand that your particular connection with industries consists in that you had a paper manufactory for many years and that you have had to give it up because of competition elsewhere?—*A.* Yes.

Q. On considering the question further are you sure that there is a good opportunity for a paper manufactory where the one established by you was situated?—*A.* I think there is quite a good scope provided the manufacture is not done under steam power. If we do it under steam power we cannot compete with the paper making firms in Belgium and Holland. But if turned out under water power, then and only then could it be done successfully This is what I suggested. If the machines are fixed up in some place where there are big water falls then I am sure we can compete with Holland and Belgium. For every ton of paper it requires about 3 tons of coal and 5 tons of water. Coal is very expensive and water facilities are also wanted. In Courtallum and in the Periyar projects we can get grass. We can grow fibre plants. We can also get any other materials which may be suited for paper making. That is why I suggested that the manufactory should be fixed up somewhere near either the Periyar project or Courtallum. Only if the machine is turned under water power, can the venture hope to be successful.

Q. What kind of paper were you manufacturing at Perambore?—*A.* We were only making very rough paper and not any machine made papers.

Q. Was it all hand made?—*A.* Yes.

Mr. C. E. Low.—*Q.* In your original factory did you sell only to the public or to both, the public and the Government?—*A.* We sold it only to Government. The rejected papers were sold to the public. The finer papers were being sold to the Government for the last 75 or 80 years. That means for nearly three generations.

Q. Do you think that if the Government demand was withdrawn you would not have been able to go on with the public demands?—*A.* I cannot do it because the foreign paper is sold at a cheaper rate in the market. I could not compete by selling it to the public. The foreign made paper is considered to be finer and better. So I could not compete.

Q. That is to say the Government were paying higher price for the local article than they would have to pay if they bought imported paper?—*A.* Yes. The price of our paper was brought down from Rs. 3-8-0 to Rs. 2-4-0 a ream. I have been all the same competing with Holland and Belgium as much as possible. When labour cannot be had as it was every day growing high I could not compete any further.

Q. So you were going on supplying to the Government and not selling very much to the general public. As the cost of imported paper become less and less you say you could not supply to the general public even if you had wished to do so?—*A.* No. I could not make sufficient paper to meet the demands of both the Government and the public.

Q. How was it that you were able to supply to Government when imported paper was selling cheaper?—*A.* I have been supplying 50 to 60 thousand rupees worth of paper. In 1888 when the Bally mills were started at Calcutta they competed with us. When their paper came out, Government thought that our paper was not worth while buying. So they cancelled our contract and began to buy from the Bally mills. Then I had to represent the matter to His Excellency the Governor in Council. They viewed the matter sympathetically and with a view to encourage local industry they ordered that one-fourth of the quantity may be purchased from us. We have been supplying with variations till about 1915. In 1915 I thought that it was not fair to trouble Government any more with my somewhat higher rates. Therefore I had to close my factory.

Q. Do you think that labour is dearer in Perambore than at the Periyar project?—*A.* Yes. In Perambore there are Perambore workshops and cotton mills which attract a good deal of local and Madras labour. Moreover Perambore is in the neighbourhood of Madras and that makes a great difference.

Q. Are you aware that the supply of water in the Periyar project would be available only for about two-thirds of the year and that the water is not flowing throughout the year?—*A.* I think it is always flowing but it may be with less force for a short time in the year.

Q. I am afraid that the water power available in the Periyar project would not be continuous. We have seen that to be the case from some official papers which we have received from the Government of Madras. You could work only for two-thirds of the year and for one-third of the year you could not work. Will you be able to conduct your manufactory successfully under such conditions?—*A.* I think that it is rather impossible, if the project can only be utilised for two-thirds of the year.

Q. Of course there may be other projects in which a continuous supply of power may be obtained. But we have received information to show that this particular project you mentioned is not a continuous project?—*A.* I did not think it was so. I do not

Q. You see there is plenty of water and you may wonder why that could not be utilised. But you must remember that the ryots want it to irrigate their rice fields which throws a certain amount of difficulty in the way?—*A.* I am sure that it will not effect the ryots in any way for there will be very little or no decrease in the quantity of water utilised for driving the machinery and the whole water can be diverted back into a channel for irrigation purposes with better advantage for such water will have more manurial effects as well.

Hon'ble Pandit M. M. Malaviya.—*Q.* Have you made any experiments in paper making?—*A.* I have been working all along for these so many years and also made some experiments.

Q. With what result?—*A.* With no favourable results, but I have been supplying to Government all the paper that I was making and selling only the rejected paper to the public.

Q. Would you require any training for the manufacture of paper by hand?—*A.* Yes. We were making hand made paper only. The important process is glazing. We want machines for tearing rags, what are called the devil machines and pumping engines. All the machines required will cost from 15 to 20 thousand rupees.

Q. Do you propose to start such a factory?—*A.* Yes.

Q. Do you think you will be able to compete in that respect?—*A.* I think we shall be able to compete. But there is one thing and that is the chief thing. We could not obtain raw materials through our own efforts. I think it would be a very good thing if the Government undertakes to make it known through Collectors and Tahsildars to get us a regular supply. The private firms cannot successfully take up such work and moreover it is rather very difficult to get the people to believe in this business as it is quite new. The public will not easily come forward to invest their money and unless the Government comes forward to help us we cannot be very successful. Government should aid us, give us plenty of money which may all be repayable. The money so given should not be withdrawn all at once before the business gets settled and they must give us some experts like Mr. Chatterton who with the information in their possession will be able to carry on the work. There is no capable paper-maker here. An expert will have to be brought out from any foreign country who will be able to carry out the enterprise successfully and also train up people here.

Q. Do you mean to say that unless Government gave all the assistance you mention to this industry it is not likely to be started?—*A.* It cannot be started. At least for a certain time the Government must have its control and aid over it.

Q. Suppose the Government were only to encourage you by purchasing your paper?—*A.* They must also help it in other ways.

Q. But suppose the Government undertook only to purchase the paper you may produce for their use?—*A.* For how long would they purchase it.

Q. If you produce good paper they may purchase it for ever?—*A.* Then we must supply either at the same rate or cheaper than other firms which will not pay us. Supposing in one year they give us As. 10 and afterwards say they can only give As. 8 per lb. in comparison with others, then we shall be left helpless.

Q. Do you know what the present rules are about the Government purchase of indigenous products? Government have laid down a rule that where there is a country made article it should be purchased in preference to a foreign article if the quality is suitable and the prices not unfavourable?—*A.* They say that the article must be suitable and that the price not unfavourable.

Q. Is not the object of putting in those words to encourage the industries and not to discourage them?—*A.* It may be to encourage the industries the Government is buying about ten lakhs worth of paper. The difference in prices between the foreign paper and mine in a supply of about 5 to 6 thousand rupees was only a difference of 5 to 6 hundred rupees in the cost at the last stage. They were using my paper for making covers and for other ordinary purposes. In this case the difference was only 5 hundred rupees and Government could not tolerate it. They said that they won't like to spend even a pie more unnecessarily and they stopped purchasing from us and so we had to close.

Hon'ble Sir R. N. Mookerjee.—*Q.* That means ten per cent?—*A.* Yes.

Hon'ble Pandit M. M. Malaviya.—*Q.* The present rule is that articles made in India shall be bought in preference to the foreign made article provided that the quality is sufficiently good for the purposes and the prices not unfavourable. This is meant to encourage the indigenous manufacture?—*A.* That one word 'provided' will be sufficient to shut out our manufactory.

Q. What alterations would you then suggest?—*A.* For a certain time of course it is true that the paper may not be good and the prices may be a little higher. Until we bring it to a successful stage and until we prove to the public that it can be cheaply manufactured and until Government puts up some demonstration factories [illegible] teaches the people, Government ought to view the matter sympathetically. They should place at our disposal experts like Mr. Chatterton whose advice will be profitable. I am sure it will be profitable provided it is done under proper supervision.

Q. You have now drifted on to another question. Confining ourselves to the Government purchase of indigenous goods, I understand you to say that the Government should purchase Indian articles in preference to foreign ones even if the quality is somewhat inferior and even if the price is a little higher than that of the foreign commodity. You mean they should help you for a few years in that way?—*A*. Yes.

Q. What percentage of concession would you expect from Government?—*A*. For the present 10 per cent at least.

Q. Do you mean to say that even if the price is 10 per cent higher the Government should prefer the local article?—*A*. Yes. Until such time that they gradually improve their quality and will be able to lessen their rate.

Q. Do you think that you can make paper of sufficiently good quality?—*A*. I do not think the paper would be in any way inferior. Only the price may be a little higher. The paper cannot be inferior if it is manufactured on the same lines as in the western countries.

Q. Do you suggest that Government should establish a demonstration factory to show the manufacture of hand paper?—*A*. Yes.

Mr. A. Chatterton.—*Q*. Do you mean bank notes?—*A*. Not bank notes. I mean the ordinary ledger paper. The blue paper with lines marked. That is purely hand-made paper.

Q. Have you got any sample?—*A*. No. Government is purchasing it at As. 10 a lb. I have not at present got any sample with me. I shall send it if necessary. The rags of linen or cotton only can be used to make such paper and they must also be superfine rags. These cannot be done with any other material such as bamboo pulp hemp or grass, etc.

Hon'ble Pandit M. M. Malaviya.—*Q*. You suggest that the Collectors and Tahsildars should help you in obtaining a supply of the rags, etc. Can you not arrange the matter without the help of Collectors?—*A*. No. It is utterly impossible. Because we do not know how to collect and wherefrom to collect. I wrote to Poona some time ago. Mr. Fisher, the Superintendent of the Government Press, asked me to make a trial. The Poona people said that what they had got was not sufficient for their own purposes. I wrote to the Poonalur people. They would not undertake it.

Q. You have got a large number of men doing business in every big city in India. If you send a circular and say that you want these rags don't you think you could establish an agency?—*A*. I do not think that my circular will in any way be valid unless it is authoritatively stated by a competent authority.

Q. You say that existing or new banking agencies must be compelled by Government to assist private and new enterprises as far as possible. I suppose you mean such agencies when they receive assistance from Government for then only can the Government bring any pressure on them?—*A*. Yes, Government may help in any way they like. Either they may advance money themselves or they may authorise any bank under their subsidy to do so. When the venture proves to be successful it may be handed over to any competent person in the same way as they did with the Chrome factory which was started at Perambore. When the business was successful they sold it by a public auction and somebody purchased it.

Mr. A. Chatterton.—*Q*. What is the principal market for this hand made paper? Is it for cash account books?—*A*. All cash books are now made of foreign paper. The rough paper is used for copy-writing. I do not know for what other uses they are put. So far, I never sold the paper to anybody but the Government. Only the rejected papers were sold to the public in the bazaar.

Q. Is there any organization for collecting rags, old paper, etc?—*A*. We have been collecting it ourselves. I do not know of any other separate organization.

Q. How many tons are you able to get?—*A*. Annually we were getting about 25 to 30 tons of waste paper.

Q. You had no other sources of raw material here?—*A*. No.

WITNESS No. 241.

LIEUT.-COL. W. D. HAYWARD, *I.M.S., Medical Storekeeper to Government, Madras*.

WRITTEN EVIDENCE.

My experience in the matter of the manufacture of chemicals and drugs is chiefly that concerned with the manufacture of chemicals, drugs and also surgical and medical instruments and [illegible] as carried out by the Medical Store Department at the Medical Store Depots at Calcutta and Madras. The work of manufacture carried out at the Madras Depôt is similar to that which used to be done at the Calcutta Depôt also, but on a larger scale, and for the purpose of this report a short description and list of work done at the Madras Depôt will suffice. A list of the preparations we make is attached, and I will consider this first.

Nearly all of these are what are called pharmaceutical preparations, such as are made up by chemists and druggists, by processes which are in some cases those of simple solution, filtration and mixing, or by extraction, percolation and maceration. Where large supplies are required, these are more accurately, expeditiously and economically made in bulk, and that is what the Medical Store Depôts are carrying out for the supplies to Government and Government-aided institutions on the civil side as well as the military hospitals and charges in India.

To take the list of laboratory preparations made here in Madras shown in the list (List A):—

Item 1. Acetum Scillae is a preparation made by maceration of Squills in Acetic Acid, a preparation requiring some days in manufacture.

The dilute acids shown from 2 to 9 are cases of simple dilution of the mineral acids named in each, with the exception of Acid Hydrocyanic Dilutum, where a process of distillation is carried out. Acidum Sulphuricum Aromaticum where a compound spirit is produced and Acidum Sulphuricum Dilutum in which Sulphuric Acid gas has to be generated and this then dissolved in distilled water. All these processes although simple, require the supervision of a skilled pharmaceutist and chemist as well as of skilled labour.

Items 10 to 12 involve the mixing and making up of antiseptic solution or the impregnation of prepared gauze.

Item 13. Antiseptic Vaseline is made up by a similar process to that of the manufacture of ointments hereafter noted.

Items 16 to 20 are processes of mixing, pounding and powdering with the exception of bandage compressing on a power machine at item 18.

Item 21. Camphorodyne is made by a rather more complicated process of solution, mixing, etc., the poisons, Morphia and Acid Hydrocyanic Dil entering into the process.

The confections items 23 to 26 are preparations made by powdering and mixing.

Item 27 by powdering, impregnating and mixing.

The emplastrums from items 28 to 36 are made by melting the ingredients, mixing, stirring, and evaporation; in the case of some, the extraction of the active principle from the bruised or powdered plant or root, either by maceration or percolation as first required.

In the case of spread plaster item 35, this involves the spreading of the soft plaster on cloth. In all these preparations a certain amount of machinery is required.

Items 37 to 58 include the Extracts and these are made either by percolation in large tincture percolators or by maceration or continued soaking and mixing. The process is lengthy in most cases and the product must be assayed and tested.

Items 60 and 61 are mixtures.

Item 62 is that of boiling or infusion of senna leaves.

Item 63. The treatment of gauze by impregnating it with prepared Iodoform.

Items 64 to 72. The liniments are severally made by processes of solution, mixing, percolation, etc., all pharmaceutical processes.

Items 73 to 91. The liquors are made by trituration, solution, percolation and mixing, and

Items 92 and 93 by mixing and combination.

Items 95 and 96 are oil pressing. The seeds being decorticated and subsequently pressed in "leaf" or "box" hydraulic presses. The processes are different from the ordinary extraction of the commercial oils, in that the latter processes also extract from the seeds, certain extractives which are not medicinal and are injurious or unnecessary. The percentage of oil extracted for medicinal purposes is considerably under that extracted by makers of non-medicinal oils, and the oil has to be afterwards put through processes of purification and filtration not required by them.

Oxygen in cylinders at item 98. Oxygen is made chemically and is afterwards compressed in steel cylinders for issue to hospitals where it is used in cases of urgent treatment as well as in some cases as a part of the routine administration of anaesthetics.

Items 99 to 102 are cases of impregnation of prepared paper with chemical reagents.

Items 103 to 164 include the pills and powders, and these are processes of pill mass making, piping, cutting rounding and coating, performed in dealing with large bulks of material and large quantities of pills by various kinds of machinery and appliances driven by motive power.

Items 114 to 164. The powders are made by processes varying from simple powdering by hand with mortar and pestle to the processes carried out by large power driven mills, edge-runners and high speed disintegrators and by mechanical mixers and sifters. The processes are pharmaceutical, the aid of machinery being called in to facilitate the dealing with large quantities in bulk; and to accelerate the outturn.

Items 166 to 172 are simple manufacture of solutions requiring no remark.

Items 174 and 175. Spiritus Ætheris Nitrosi and Spiritus Ammonia Aromaticus are distillation processes carried out in steam heated stills and the products require subsequent standardization.

Items 176 to 180 are made by solution and mixing.

Items 181 to 190. The syrups are made by processes varying from digestion of iron wire with acid, in the cases of Syrup Ferri Phosphatis Co. with heat, and of Iron and Iodine in the case of Syrup Ferri Iodi, to simple solution with heat as in the case of Syrup Simplex. The process is distinctly a purely pharmaceutical one.

The items 191 to 238 comprise the Tinctures, made by solution by maceration and subsequent percolation of the solid ingredients, be they root, leaves or flowers with spirit in large percolators with subsequent straining, pressing and filtration. Most of them require subsequent standardization and testing for strength.

Items 241 to 257. The ointments are made by melting various resins, fats and oils and dissolving the active ingredients and subsequent straining and mixing; performed in most cases in mechanical mixers, and ointment mills operated by machinery.

Items 259 to 262 are made by processes of extraction or maceration and require no remark.

Items 271 to 278 are pills—see remarks on items 106 to 113.

Items 279 to 313 are those of tablet making. These are made on tablet machines which are power driven. The ingredients being first powdered, mixed, granulated and prepared are then compressed into tablet form by a series of rapidly operated punches and dies in the Tablet machines. These machines enable a large amount of ingredients to be accurately and expeditiously dealt with and turned into tablet form for issue.

From the above notes on the list of our preparations it will be seen that the processes of manufacture we carry out are almost entirely pharmaceutical, that is to say druggist's work carried out on a large scale by the aid of machinery. Combined with this work is the analytical and chemical work entailed in testing, assaying and standardizing the preparations and examining for impurities either in the raw materials or the finished products, work absolutely necessary in the production of drugs and chemicals where not only are poisons dealt with, but on accuracy in strength and constitution depends, the correct dosage, and use in treatment of the drugs manufactured.

This latter work namely that of analysing and testing the drugs and chemical products is a work that must be carried out (in my opinion) by the Medical Store Depôts for the supplies of these articles to the hospitals and institutions both civil and military under their charge, and the manufacture of the above mentioned and other drugs, chemicals and preparations on the large scale required for those charges forms in my opinion a legitimate work for Government to carry on in Medical Stores Depot laboratories.

These manufactures as regarded from the point of view of encouragement of industrial development are in my opinion already met to some considerable extent for the outside public by the chemical and drug manufacturing firms at present in existence in India and I consider that the development of those industries may be safely left to private enterprise. The processes are well known, are not secret in any way and should be left to private initiative and commercial enterprise to establish in the country.

As regards the provision of the raw materials required for use in making these pharmaceutical preparations and for the drugs required for issue; a large number of these are of vegetable origin and growth, and as such those that can be grown in India could be dealt with by the Agricultural or Forest Departments or the planting community of India. Several of these medicinal plants and herbs are already grown in India or Ceylon and the growth of others can be investigated and encouraged. We do now get several of these from other countries which could I believe, be grown and produced in India. I append two lists of drugs plants which we use. List B shows the plants grown in India. List C shows the drugs most of which we import but which I believe, might be grown in India. Of these * *Aconite* grows in India more especially in the Nepal hills, but we are still obtaining it from home. The plant grown in Nepal differs somewhat from the plant we use and indeed cannot be relied on as being the same plant, but I believe this could be investigated and the true Aconitum Napellus would be found to grow in India.

Indian hemp is already grown in India under Government control and we get our supplies from them.

Capsicum is a common Indian growth.

Cardamom do.

Coriander do.

Chiretta do.

Cinchona bark grown in the hills.

Croton oil a local article.

Fennel seed obtained locally.
Kino Forest Department used to supply but supply now stopped.
Linseed oil Indigenous.
Nux Vomica do.
Castor seeds do.
Opium do.
Pepper Common article.
Red Sandal wood Indigenous.
Sandal wood oil do.
Senna leaves do.
Tamarinds do.

All of these are indigenous and we obtain them as raw materials in the country with the exception of Aconite. Until recently we obtained Sandal wood oil from home but it is now being manufactured in Mysore and can be obtained from there.

List C—

Aloes is at present imported, the growth and provision of the proper variety required in medicine has not been arranged for in India or systematized. This could be done.

Belladonna can be grown in Kumaon and the Forest Department there have made experiments and grown a small quantity. It is capable, I believe, of extension.

Caraway is obtainable locally and can be more extensively grown.

Colchicum although usually put down as of European origin could I believe be grown successfully in India.

Colocynth at present imported, the question of its growth in India should be investigated.

Digitalis leaves can be grown and have been done so at Ootacamund on a small scale, its growth is I think capable of extension.

Gamboge grows in Siam and could probably be successfully exploited in India.

Ginger common indigenous.

Henbane-Hyoscyamus. This is imported. Can be grown in India. Madras Forest Department has sent samples and it can be grown successfully.

Ipecacuhana. Attempts to grow this in India so far without good success have been made, but this attempt is worthy of repetition.

Jalap can be grown successfully.

Liquorice root common.

Podophyllum. An American plant. Podophyllum Emodi grows in India and contains more resin than the American. Requires investigation.

Rhubarb. Originally a Chinese growth and best medicinal varieties still Chinese. Capable of growth in India. Requires investigation and trial. At present imported from England.

Saffron. Available, indigenous and common.

Stramonium. Datura Stramonia is indigenous and common. At present imported.

Resin, Turpentine. The resinous exudation and an oil extracted from the trees of the pine species can be obtained in India. Its possibilities should be investigated by the Forest Department. Supplies have already been made by the Forest Department but the method of extraction or purification was not sufficiently good or successful and the oil of Turpentine I have seen was not of good quality.

In further information on this point, an article in the Pharmaceutical Journal and Pharmacist, dated the 15th July 1916, giving the Presidential address of Mr. D. Hooper to the Pharmaceutical Society for the year 1916 gives the opinion of a Chemist and Pharmaceutist of known knowledge and experience with a large knowledge and experience of Indian conditions and capabilities, the opinion of an expert on the question.

Where the process of manufacturing drugs from these raw materials involves only pharmaceutical processes, they can be carried out by this department or by the manufacturing chemist and druggist firms at present in existence. The amount of the annual requirements of the Madras Depôt are shown in the lists. Where the plants and raw materials occur in India, the export of the raw materials and products would probably develop and produce a paying industry apart from the requirements of India itself. Further investigation and experiment is needed and the undertaking of this might, I think, be made in several cases by the Forest and Agricultural Departments under Government, the future development of the industries being left to private enterprise when the methods of growth and manufacture had been ascertained. Planters and others would probably take the matter up, if it were found to be commercially sound and promising.

Apart from the investigation of this class of drugs, mostly vegetable drugs we have the question of the drugs, and products of mineral and chemical origin, the utilization of natural mineral deposits; and the manufacture by chemical processes of drugs from these. As a general case the exploitation of these is more suitable for commercial enterprise than for manufacture at the Medical Store Depôts and my [illegible] of these manufactures is therefore [illegible] drugs of mineral origin for which the deposits of raw material occur in this country are already exploited in many instances by the existing manufacturing chemical firms along with the manufacturers involving processes of distilling other chemical processes of manufacture.

We obtain the alcohol required in our pharmaceutical work from distilleries in Bengal and Madras. Ethylic alcohol is made on a large scale by them. Methylic alcohol could be made by the same firms by the destructive distillation of wood. Ether is already produced from alcohol by a firm of manufacturing chemist near Calcutta.

Chloral and Chloroform can be and are made also by them. Some of the inverted sugars such as Glucose and Dextrose can be made.

Acetic acid from distillation of vinegar or wood can be made.

Salts of Potash, Sodium and Magnesium Many of these salts are already made in India and we should I think be able to obtain our supplies of Epsom salts and other salts of these metals locally but for the more difficult processes of making Chlorates Prussiates, etc., the cost of skilled supervision and of special plant for the manufacture makes a difficulty.

Glycerine could I believe be manufactured in this country from fats by decomposition by superheated steam.

Phenols and Cresols made from Coal tar can be manufactured but at present tar is high in price and scarce and the possibilities require investigation.

As regards the production of fine chemicals, the climate of the plains of India are against the manufacture of these, though many might be made in selected places. As an instance we have had under trial the manufacture of Thymol from Ajuvan oil in Madras, but it has been found to be certainly difficult to crystallize and separate the pure Thymol both in this climate and also in that of Calcutta. In Dehra Dun a quantity of good Thymol is now being made and this is a great deal helped by the difference in the climate and the coolness of the air.

As regards the extraction of alkaloids and glucosides required as drugs, it would probably only be in the case of those in which the raw materials are available in India that their manufacture would be profitable.

If we can get Ipecacuhana root grown here successfully we can consider the extraction of Emetine; if Digitalis is successfully grown, Digitalin. At present we get our Ipecacuhana from Brazil and Digitalis from Europe.

Of the extracts and alkaloidal preparations which could be taken up I would mention Strychnine from Nux Vomica and Caffeine from waste tea. These are chemical industries which will require skilled chemists and labour and the prospects of their commercial success is a matter of which I have no means of accurately judging.

The question of the weaving of the special materials required for medical and surgical dressings has been also considered from the point of view of the Medical Store Depôts taking up the work. My own opinion is that the work is one which could be better carried out by the cotton and other spinning and weaving firms already in existence. The special materials required such as lint, Gamgee tissue, special qualities of bandage and gauze could be, I believe, made by the mills in existence in India. As regards the preparation of the medicated dressings only, it might possibly be advantageous to carry out the processes at Medical Store Depôts. These processes could also be carried out and the complete dressings manufactured by the existing mills. At present we import all but the most simple of dressings. The materials woven at jails are of too poor a quality for any but the simplest requirements. The mills in India are at present unwilling to take sufficient trouble, to manufacture bandages, gauzes and materials required for surgical dressings which will compare in any respect with what we get from home. I do not think it will ever be possible for Government to advantageously carry out the manufacture of these surgical dressings at Medical Store Depôts, but consider that attempts should be made to get the spinning and weaving firms out here to manufacture the special materials required, of a proper standard and quality. Until that can be done, we must continue to import these from home.

LIST A.

List of Laboratory preparations of the Madras Depôt.

Serial No.	Preparation.		Quantity in a lot.	Minimum stock (six months' reserve).
1.	Acetum scillæ	lb.	400 to 420	50
2.	Acidum aceticum	,,	800	2,300
3.	,, ,, dilutum	,,	250	200
4.	,, hydrochloric dilutum	,,	106	30
4a.	,, hydrocyanicum dilutum	,,	30	100
5.	,, nitricum dilutum	,,	10	
6.	,, nitro-hydrochloric dilutum	,,	68—8	20
7.	,, phosphoric dilutum	,,	50	90

Serial No.	Preparation.		Quantity in a lot.	Minimum stock (six months' reserve).
8.	Acidum sulphuric aromat	lb.	51—8	35
9.	„ „ dilutum	„	100	130
10.	Antiseptic gauze	yds.	1,130	5,000
11.	„ solution for antiseptic gauze	lb.	249	..
12.	„ solution No. I	„	200	500
13.	„ vaseline	„	84	200
14.	Aqua destillata	galls.	..	..
15.	„ chloroform	„	250	250
16.	Artificial sherry	lb.	219	200
17.	Asafetida preparata	„	20 to 25	30
18.	Bandages compressed	No.	as required.	
19.	Boro iodoform	lb.	145 to 150	..
20.	Bric powder	„	576	4,000
21.	Champhorodyne	„	160	800
22.	Calcii hydras	„	10	10
23.	Confectio piperis	„	21	20
24.	„ rosæ gallicæ	„	24	20
25.	„ senna	„	32	40
26.	„ sulphuris	„	30	60
27.	Disinfecting powder, carbolic	cwts.	6	36
28.	Emplastrum belladonnæ	lb.	90	450
29.	„ hydrargyri	„	53—4	50
30.	„ mylabris cichorii B.P. 1898	„	80	80
31.	„ cantharidini	„	1,000 grammes.	..
32.	„ opii B.P. 1898	„	75	15
33.	„ plumbi	„	128	500
34.	„ resinæ	lb.	144	2,880
35.	„ resinæ spread	yds.	90 to 95	1,000
36.	„ saponis	lb.	100	10
37.	Extractum aloes	„	31	50
38.	„ belæ liquidum	„	50	25
39.	„ belladonnæ liquidum	„	125	1,250
40.	„ cannabis indica	„	9	50
41.	„ colocynthidis co.	„	86	86
42.	„ coto liquidum	„	11	10
43.	„ ergotæ (Ergotin)	„	13—7	2
44.	„ „ liquidum	„	100	1,000
45.	„ gentianæ	„	14	75
46.	„ glycyrrhizæ	„	10	..
47.	„ „ liquidum	„	45	180
48.	„ hydrastis liquidum	„	100	100
49.	„ holarrhena antidysentrica	„	30	..
50.	„ ipecac liquidum	„	..	..
51.	„ jaborandi liquidum B.P. 1898	„	10	12
52.	„ grindilæ liquidum	„	30	1
53.	„ nucis vomicæ siccum	„	28	40
54.	„ „ „ liquidum	„	..	400
55.	„ opii siccum	„	12	5
56.	„ „ liquidum	„	60	30
57.	„ symplocos racemosa	„	35	..
58.	„ sarasa liquidum B. P. 1898	„	10	35
59.	Ferri sulphas exsiccat	„	11	8
60.	Hydrargyri cum creta	„	27	30
61.	„ „ saccharata	„	58	70
62.	Infusion senna	„	20	When required for Mutula Senna Co.
63.	Iodoform gauze	yds.	50	as required.
64.	Linimentum aconiti	lb.	56	100
65.	„ belladonnæ	„	300	1,500
66.	„ camphoræ	„	25 to 26	70
67.	„ „ ammoniatum	„	460	7,000
68.	„ chloroformi	„	50 to 51	80
69.	„ opii	„	200	140
70.	„ saponis	„	440	6,000

Serial No.	Preparation.		Quantity in a lot.	Minimum stock (six months' reserve).
71.	Linimentum terebinth	lb.	100	1,000
72.	,, ,, aceticum	,,	20	20
73.	Liquor ammoniæ	,,	300	200
74.	,, ,, acetatis	,,	200	..
75.	,, ,, ,, fortis	,,	120	450
76.	,, arsenicalis	,,	200	450
77.	,, arsenici hydrochloricus	,,	5	30
78.	,, arsenii et hydrarg. iodidi	,,	100	200
79.	,, bismuthi et ammonii citras	,,	35–6	30
80.	,, cresol saponatus	,,	100	..
81.	,, coccinii concentrated	,,	..	..
82.	,, epispasticus	,,	50	70
83.	,, ferri perchlorid fortis	,,	105	600
84.	,, halleri acidi	,,	20	20
85.	,, morphinæ hydrochloras	,,	50	70
86.	,, opii sedativi	,,	80	60
87.	,, plumbi subacetatis fortis	,,	100	500
88.	,, potassæ	,,	110	800
89.	,, soda chlorinata	,,	18	10
90.	,, sodii hydroxide	,,	10	10
91.	,, strychninæ hydrochloridi	,,	16	120
92.	Mistura pro diarrhœa	,,	92	700
93.	,, senna co.	,,	10	40
94.	Mucilage acaciæ	,,	10	..
95.	Oleum arachis	,,	..	7,000
96.	,, ricini	,,	..	35,000
97.	Omum water	,,	60	..
98.	Oxygen in cylinders	c. ft.	..	300
99.	Paper, litmus, blue	sheets.	75	75
100.	,, ,, red	,,	85	80
101.	,, paraffin common	qrs.	24	20
102.	,, turmeric	sheets.	75	75
103.	Pilula aloes et asafetida	,,	10	5
104.	,, ,, ferri	,,	22	60
105.	,, ,, myrrhæ	,,	32	100
106.	,, colocynth co.	,,	5	..
107.	,, ,, et hyoscyami	,,	6	6
108.	,, hydrargyri	,,	24	50
109.	,, ,, subchloridi comp.	,,	33	30
110.	,, ipecac et scillæ	,,	22	22
111.	,, plumbi c. opio	,,	10	..
112.	,, rhei comp.	,,	84	100
113.	,, scillæ comp.	,,	40	200
114.	Pulvis acaciæ	,,	118	600
115.	,, acalypha indica	,,	175	..
116.	,, aconiti radix	,,	20	60
117.	,, adhatoda	,,	175	..
118.	,, alumen	,,	24	..
119.	,, belladonnæ	,,	345	1,200
120.	,, borax	,,	26	..
121.	,, cannabis indica	,,	50	50
122.	,, capsici	,,	10	30
123.	,, cardamomi	,,	42¼	25
124.	,, carui fructus	,,	12	12
125.	,, caryophilli	,,	10	10
126.	,, cascara sagrada	,,	112	40
127.	,, chirata	,,	83	60
128.	,, cinchona rub. cortex	,,	103	400
129.	,, cinnamomi	,,	29½	30
130.	,, creta aromaticus	,,	172	780
131.	,, ,, ,, c. opio	,,	79	250
132.	,, digitalis	,,	30	60
133.	,, fœniculi	,,	15 to 19	25
134.	,, galla	,,	30	25
135.	,, gelsemii radix	,,	19	10
136.	,, gentianæ	,,	110	200
137.	,, glycyrrhizæ	,,	[illegible]	150

Lieut.-Col. W. Hayward.

Serial No.	Preparation.		Quantity in a lot.	Minimum stock (six months' reserve).
138.	Pulvis glycyrrhizæ co.	lb.	50	75
139.	,, hamamelis folia	,,	24	100
140.	,, hydrastis rhizoma	,,	5	10
141.	,, ipecacuanha	,,	87	100
142.	,, ipecac co.	,,	98½	600
143.	,, jalap	,,	92	500
144.	,, jalap co.	,,	149	1,500
145.	,, kino co.	,,	74	60
146.	,, lobelia	,,	10	20
147.	,, mylabris cichorii B.P. 1898	,,	56	112
148.	,, myristicæ	,,	15	80
149.	,, nux vomica	,,	30	150
150.	,, pepper	,,	18-6	30
151.	,, rhei co.	,,	88½	300
152.	,, rhei rhizoma	,,	91	100
153.	,, saccharum purificatum	,,	90	6,000
154.	,, sapo durus	,,	11	60
155.	,, ,, animalis	,,	11	20
156.	,, senega radix	,,	50	100
157.	,, sarsa radix B.P. 1898	,,	50	80
158.	,, scillæ	,,	50	50
159.	,, senna	,,	52	25
160.	,, stramonii semina	,,	12	25
161.	,, tragacanth co.	,,	14	1
162.	,, valeriana rhizoma	,,	5	..
163.	,, virginiana pruni bark	,,	5	6
164.	,, zingiberis	,,	94	500
165.	Sevum benzoatum	,,	12	24
166.	Solution Fehling's No. I	,,	5 lb. 5 oz.	5 lb. 5 oz.
167.	,, ,, No. II	,,	5 lb. 15 oz.	5 lb. 15 oz.
168.	,, formalin, 40 per cent	,,	..	as required
169.	,, litmus, blue	,,	10	as required for litmus paper.
170.	,, Nessler's	,,	30	as required.
171.	,, for preservation of records	,,	1 lb. 4 oz.	,,
172.	,, ,, ,, fish	,,	20	,,
173.	Spiritus ætheris	,,	300	1,503
174.	,, ætheris nitrosi	,,	100 to 185	5,000
175.	,, ammonia aromaticus	,,	240	6,000
176.	,, camphoræ	,,	10	10
177.	,, chloroformi	,,	20	10
178.	,, cinnamomi	,,	10	2
179.	,, juniperi	,,	18¾	60
180.	,, methylatus	,,	500	4,000
181.	Syrupus aurantii	,,	100	450
182.	,, calcii hypophosphas	,,	50	50
183.	,, Easton's	,,	50	75
184.	,, ferri iodi	,,	180	600
185.	,, ferri phosph. co.	,,	60	250
186.	,, glucose	,,	60	100
187.	,, pruni virginianæ	,,	20	16
188.	,, scillæ	,,	100	70
189.	,, simplex	,,	110	900
190.	,, tolutanus	,,	85	300
191.	Tinctura aconita	,,	100	80
192.	,, arnica florum	,,	100	100
193.	,, asafetida	,,	100	450
194.	,, aurantii	,,	500	1,000
195.	,, belladonnæ	,,	100	600
196.	,, benzoini co.	,,	200	500
197.	,, calumbæ	,,	500	1,500
198.	,, camphoræ co.	,,	900	6,000
199.	,, cannabis indicæ	,,	100	250
200.	,, cantharadini	,,	100	100
201.	,, capsici	,,	100	300
202.	,, cardamomi co.	,,	900	5,000

Serial No.	Preparation.		Quantity in a lot.	Minimum stock (six months' reserve).
203.	Tinctura catechu	lb.	800	600
204.	„ chiratæ	„	200	60
205.	„ chloroformi et morphin co.	„	50	180
206.	„ cinchonæ	„	400 (variable).	1,500
207.	„ „ co.	„	400	2,000
208.	„ cinnamomi	„	200	200
209.	„ „ special for mistura pro diarrhœa ..	„	200	500
210.	„ colchici	„	100	6
211.	„ digitalis	„	200	500
212.	„ ferri perchloridi	„	405	1,800
213.	„ gelsemii	„	50	100
214.	„ gentian co	„	500	4,000
215.	„ guaiaci ammoniata	„	10	12
216.	„ hyocyami	„	900	2,500
217.	„ hydrastis	„	100	50
218.	„ iodi mitis	„	500	8,000
219.	„ iodoi fortis	„	500	200
220	„ kino	„	200	200
221.	„ lavandulæ co.	„	100	100
222.	„ lobelia aetheria	„	200	500
223.	„ myrrhæ	„	50	50
224.	„ nucis vomicæ	„	800	1,250
225.	„ opii	„	450 (variable).	2,000
226.	„ podophylli	„	100	20
227.	„ podophylli indici	„	100	20
228.	„ quassiæ	„	800	800
229.	„ quininæ ammoniata	„	50	200
230.	„ rhei co.	„	500	500
231.	„ scillæ	„	400	1,500
232.	„ senegæ	„	400	1,200
233.	„ sennæ co.	„	200	450
234.	„ stramonii	„	10	20
235.	„ strophanthi	„	60	45
236.	„ turmeric	„	10	5
237.	„ valerianæ ammoniate	„	200	200
238.	„ zingiberis	„	900	2,500
239.	Tonic powder (vety.)	„	4	40
240.	Tragacanth mucilage for coating pills	„	2	..
241.	Unguentum acidi borici	„	99	6,000
242.	„ cetacei	„	290 to 800	2,000
243.	„ creasoti	„	10	10
244.	„ gallæ	„	47	50
245.	„ gallæ cum opio	„	50	100
246.	„ hydrargyri	„	20	600
247.	„ „ ammon	„	10	85
248.	„ „ nitratis	„	104	1,200
249.	„ „ oleati	„	20	15
250.	„ „ oxidum flav.	„	25	500
251.	„ ichthyol	„	100	20
252.	„ paraffini	„	90	100
253.	„ picis liquidæ	„	27	85
254.	„ resinæ	„	280	1,500
255.	„ sabinæ B P. 1885	„	15	10
256.	„ sulphuris	„	147	6,000
257.	„ zinci	„	118	1,000
258.	Varnish gum sandarac for pills	„	3	As required for pills.
259.	Vinum antimoniale	„	100	200
260.	„ colchici	„	100	200
261.	„ ferri citratis	„	5	10
262.	„ ipecacuanhæ	„	500	4,000
263.	Artificial sherry for vinum ipecacuanhæ	„	475	As required.
264.	Pill No. 1 (acetate of lead and opium B.P.) 5 grs. ..	No.	82,000	50,000
265.	„ No. 2 (calomel, colocynth and rhubarb each 2 grs.)	„	57,000	200,000

Serial No.	Preparation.		Quantity in a lot.	Minimum Stock (six months' reserve).
266.	Pill No. 3 (camphor, opium, capsicum, asafœtida and pepper, each ½ gr.)	No.	50,000	100,000
267.	Pill No. 4, opium 1 gr.	,,	73,000	142,000
268.	,, No. 5, ipecac, and opium	,,	14,400	27,000
269.	,, aloes et asafœtida	,,	6,000	1,700
270.	,, ,, et ferri, 5 grs.	,,	4,800	70,000
271.	Pills, anti-constipation	,,	8,000	8,000
272.	,, cholera with opium, 1/16 gr.	,,	70,000	100,000
273.	,, ,, without opium	,,	21,000	60,000
274.	,, colocynth et hyoscyami	,,	..	..
275.	,, cough 3½ grs.	,,	21,000	70,000
276.	,, potass. permanganas 1 gr.	,,	72,000	800,000
277.	,, scillœ and ipecac	,,	20,000	12,000
278.	,, scillœ co.	,,	35,000	200,000
279.	Tablet acid acetic salicylas, 5 grs.	,,	56,000	140,000
280.	,, Blaud's co.	,,	14,000	15,000
281.	,, No. 1, phenacetin, 5 grs.	,,	71,000	50,000
282.	,, phenacetini cum caffeine, 5 ,,	,,	28,000	34,000
283.	,, No. 2, pulv. ipecac co., 5 ,,	,,	3,400	120,000
284.	,, ,, ,, 10 ,,	,,	32,000	82,000
285.	,, pulvis ipecac, 5 ,,	,,	2,948	50,000
286.	,, No. 4 ,, creta aromatic c. opio, 5 grs.	,,	36,000	25,000
287.	,, pulvis creta aromaticus, 5 grs.	,,	14,000	14,000
288.	,, No. 5 creta jalap co, 5 grs.	,,	33,000	13,000
289.	,, No. 6, quin. sulphas, 2 ,,	,,	85,000	3,000,000
290.	,, ,, ,, 5 ,,	,,	161,000	2,500,000
291.	,, quininae hydrochlor, 5 ,,	,,	665	..
292.	,, acidum boricum, 5 ,,	,,	67,000	2,000,000
293.	,, ,, tannicum, 5 ,,	,,	830	25,000
294.	,, ammon. carbonas, 5 ,,	,,	9,000	150,000
295.	,, bismuth salicylas, 10 ,,	,,	14,000	35,000
296.	,, cholera	,,	32,000	130,000
297.	,, hydargyri subchloridum, 1 gr.	,,	32,000	40,000
298.	,, hydrargyri c. creta, 2 grs.	,,	24,000	60,000
299.	,, hypertonic, 32½ ,,	,,	4,000	4,000
300.	,, potass. bromidum, 10 ,,	,,	14,000	60,000
301.	,, ,, chloras, 5 ,,	,,	26,000	60,000
302.	,, ,, iodid. 5 ,,	,,	31,000	50,000
303.	,, ,, nitras. 5 ,,	,,	1,300	15,000
304.	,, ,, permang., 2 ,,	,,	32,000	40,000
305.	,, ,, ,, 1 gr.	,,	75,000	50,000
306.	,, ,, ,, 4 grs.	,,	15,600	50,000
307.	,, pulvis rhei co., 5 ,,	,,	13,000	50,000
308.	,, sodii bicarb, 5 ,,	,,	850	100,000
309.	,, ,, chlorid, 30 ,,	,,	2,000	4,000
310.	,, ,, salicylas, 5 ,,	,,	68,000	50,000
311.	,, sulphonal, 5 ,,	,,	6,000	2,000
312.	,, trional	,,	4,000	..
313.	,, worm (santonine)	,,	5,600	35,000

LIST B.

Drugs which are indigenous or are recognised as East Indian.

Name.	Annual expenditure.	Name.	Annual expenditure.
	LB.		LB.
Aconite root	500	Linseed oil	1,600
Indian hemp	500	Nux vomica	600
Capsicum	100	Castor seed	400,000
Cardamom	400	Opium	600
Corriander	50	Pepper	100
Chiretta	2,600	Red sandal wood	50
Cinchona bark	1,800	Sandal wood oil	400
Croton oil	20	Senna leaves	1,000
Fennel seed	20	Tamarinds	20
Kino	200		

List O.

Drugs grown on a limited scale and are capable of extended cultivation and exploitation.

Name.	Annual expenditure.	Name.	Annual expenditure.
	LB.		LB.
Aloes	400	Ipecacuhana	600
Belladonna leaves	100	Jalap	1,400
Belladonna root	2,500	Liquorice root	* 1,000
Caraway	200	Podophyllum	10
Colchicum Cormus	100	Resin	1,800
Colocynth	80	Rhubarb	400
Digitalis leaves	300	Saffron	5
Gamboge	..	Stramonium leaves	10
Ginger	* 3,000	Turpentine oil	50,000
Henbane	700		

Oral Evidence, 30th January 1917.

Sir F. H. Stewart.—*Q.* I gather on reading your report that generally speaking you think there is a good deal more that could be done in the way of investigation and that the actual manufacture could be left to private enterprise? Is that so?—*A.* Yes. I think that a lot of vegetable drugs are worth investigating. There are a lot of things that we are getting from home and from other countries that are to a certain extent found in India and the growth of which could be extended and also certain other things that we could grow for which we have need at present.

Q. Who should be the people to look into that?—*A.* The Forest Department undoubtedly.

Q. Do you think that they have got the organisation at present in the way of expert officers?—*A.* I think so. In the Botanical gardens at Ootacamund they have already done a good deal of small investigation already. They have gone into one or two questions and we have also done a certain amount. They could easily do it.

Q. Have they made any experiments with respect to starting more gardens and plantations?—*A.* I do not know of any. All I know about it is that there was a proposal some years ago before I came to Madras that we should actually start a garden in connection with medical stores and the matter was gone into the extent of enquiring into the cost of plots of land up in the Nilgiris. The whole thing fell through on account of the expense.

Q. How many Medical Stores Departments are there?—*A.* Madras is one among four. There are Medical Stores Departments in Madras, Calcutta, Bombay and Rangoon.

Q. You also do a certain amount of manufacturing?—*A.* Yes. We manufacture most kinds of drugs, except the synthetical ones, such as iodoform, etc. All the things that can be manufactured here we manufacture and we send also to Burma and Bengal from here.

Q. But the general sense of your evidence is that much more investigation in research should be conducted out here?—*A.* Certainly.

Q. Do you think that the manufacturing will be satisfactorily done if it is largely left to private enterprise? Could the firms of drug manufacturers fulfil the requirements pretty well?—*A.* I think so. My own opinion is that Government is quite right in manufacturing through their own department for Government hospitals. We only supply to Government aided hospitals. We do not supply anybody outside.

Q. You do not compete. There is no interference of that sort?—*A.* No.

Q. Have you got any Government plantations down here for quinine?—*A.* We have up at Ootacamund.

Q. What is your opinion about that? Do you think it should be extended from the Government point of view?—*A.* Certainly. I think so.

Q. How does the plantation at Ootacamund compare with the one near Darjeeling?—*A.* I have not visited the Darjeeling one. That at Ootacamund is a big one. They have got a lot of new plantations with a kind of tree that ought to give a better yield. They take a long time in coming on. About two years ago they told me that the thing would be in full operation in seven years from then. It is now already four or five years since then.

Q. Do you think that Government plantations should be started for anything else besides cinchona?—*A.* We are only concerned with medical stores. We ought to be able to get this from the Forest Department. The demands are not so very big. The Forest Department could easily supply our requirements and a small patch of cultivation would be able to supply them.

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* Being obtained locally.

Hon'ble Mr. C. E. Low.—*Q.* You get one kind of plant from which you get your drugs growing very sporadically for instance in the jungles and also gregariously which you could easily tackle. The sporadic plant would require much more organisation and expense and if you can do so, you would naturally like to grow it on a full scale?—*A.* Yes.

Q. Whether it is a shrub, or a herb or a tree. What do you think is the best agency for deciding what sort of plants it would be profitable to grow?—*A.* I am afraid the only agency is the people we have now in the Botanical gardens here and also in Darjeeling.

Q. They have not the staff to speak of. They certainly have not the equipment for production on a full scale?—*A.* No.

Q. On the other hand the agricultural department has?—*A.* I suggested in my note that the Agricultural or the Forest Department may take the matter up.

Q. Where the plant is a crop growing from year to year it is the business of the Agricultural Department?—*A.* Certainly.

Q. The Forest Department might hardly be prepared to take up regular field cultivation. There is no virtue in one department or the other except that they are used to different kinds of work?—*A.* Yes.

Q. And the Forest Department could presumably investigate the conditions under which these things exist in the forest with reference to facilities of collection and so forth?—*A.* Yes.

Q. Do you ask the Forest Department to collect certain plants for you?—*A.* Yes. I have dealt chiefly with the Botanical Association in Ootacamund. I do not know whom they come under.

Q. There are certain difficulties about collecting this minor forest produce and the forest contractor is probably not a man of great resource or learning and he might find it difficult to get any one particular quality for you. That sort of thing wants going into?—*A.* Certainly.

Q. For instance take this question of aconite. It grows on a fairly large scale in the Himalayas. And then about the question of dressings, a witness appeared in Calcutta, a Bengali gentleman who said that he was making lint, antiseptic lint, on a large scale?—*A.* I have obtained cotton wool from Andrew Yule & Co. They have been making it in Calcutta.

Q. What length of staple?—*A.* I have not gone into the question. We propose removing to the Gun Carriage Factory in two or three months' time and there we propose taking up weaving. I have not gone as yet into the question fully and I am not certain whether it will ever be worth our doing right through the process of weaving and manufacturing dressings. We want the staple of the wool as long as possible.

Q. My point is this. This gentleman said that he was making this stuff and he could not succeed in selling it to Government for hospital use whereas certain competitors were selling theirs and he expressed himself very dissatisfied with the position. He could not get a clear reply why he could not sell the stuff?—*A.* It is probably on account of the shortness of its staple. As far as my experience goes, there is a demand which is small. Therefore the people are not prepared to go to the length of making it. You cannot get the dressings in this country that you can get from home.

Q. You have no specific knowledge of this particular individual or why he was turned down?—*A.* None at all.

Q. You know that the maximum length of cotton which is suitable and which can be made in this country is about an inch. You do not get anything better than that in India?—*A.* The suitability is good deal a matter of the kind of preparation the cotton undergoes.

Hon'ble Pandit M. M. Malaviya.—*Q.* Do you manufacture only for purposes of Government supply?—*A.* Government aided hospitals.

Q. None of it goes to the general public? They do not indent?—*A.* No.

Q. Are you able to meet the requirements of the Government hospitals fully?—*A.* Yes.

Q. These articles that you manufacture here are not required to be imported from outside?—*A.* We make the fullest use of the articles found locally to meet our needs.

Q. Is there any firm here which has been manufacturing these articles which you are manufacturing at present?—*A.* I do not know of any firm manufacturing it here.

Q. And these depôts in Calcutta, Rangoon and Bombay are managed by Government?—*A.* Yes.

Q. They do not administer to the needs of the general public?—*A.* The Calcutta and Rangoon ones do not manufacture. They only store things and send them on. I supply Calcutta from here with all the things that can be manufactured in India; and the home things are brought out from home. I supply Rangoon. Bombay manufactures and Lahore does, but not so much. This is the biggest one.

Q. Do you mean in the quantity or the number of articles manufactured?—*A.* In both

Q. How long has this store been in existence?—*A*. I could not say. I do not know. It must be a good many years now. It must be 20 or 30 years.

Q. What staff have you got?—*A*. I have got two assistant surgeons and a chemist and a certain number of compounders. I have got about 10 or 12 compounders and the rest of the staff are practically what we might call the packer class.

Q. I presume that you manufacture these drugs and medicines at a much cheaper rate than you can get from outside?—*A*. Yes.

Q. Would it be 50 per cent cheaper?—*A*. It all depends. Probably 30 per cent.

Q. In view of the great requirements of India and of the large imports of medicines and drugs that we have to make, don't you think that this should be extended in order to meet the needs of the general public also?—*A*. I think so. I think the general public should help to meet their own needs. After these things are investigated as far as the research goes, then you will probabaly find that private enterprise will supply the need for the general public.

Q. Would you recommend that private enterprise should be asked to meet the needs of Government?—*A*. I should see the public wants supplied by private enterprise.

Q. From your knowledge of this branch do you know if there are many firms manufacturing these medicines.?—*A*. The Indian firms are not very many. There is one firm in Calcutta.

Q. Which is that?—*A*. Messrs. Waldie & Co. The Bengal Chemical and Pharmaceutical Works have started recently. Messrs. Smith Stanistreet & Co. manufacture to a certain extent.

Q. Do you take in any apprentices under you to teach them how to manufacture these drugs?—*A*. No. Nobody except these compounder class. Some of them work in the laboratory. They do not go any further. One or other of these might hope to become a chemist eventually.

Q. You would have no objection to taking assistant surgeons to manufacture these drugs?—*A*. Yes.

Q. Do you think it would be a good thing to have a system of apprentices who might after gaining experience start these works?—*A*. I do not see that there is any harm. There is no objection to it.

Mr. C. E. Low.—*Q*. This witness who appeared in Calcutta, Mr. Mitra told us that he prepared medicated cotton for use in this country?—*A*. Not as regards Madras. I know for a fact that when I was in Calcutta we never got anything in the country in the way of dressings before the war.

Q. You import your long staple cotton?—*A*. We import the whole dressing as it is. The absorbant wool is made up in packages.

Q. And treated before they came out here?—*A*. They were all manufactured there by medical firms.

Q. Could any of them be obtained in this country?—*A*. Not that I know of. I have had no notice from anywhere of being able to get anything except plain absorbant wool.

Q. What is this absorbant wool?—*A*. The wool is treated to make it absorbant and bleached in a medicated way.

Q. Have you been able to obtain it from any places in India?—*A*. I got a small amount from Andrew Yule & Co. It was not sufficiently good.

Q. Where do you get your boric acid from?—*A*. From home.

Q. You do not make in the local laboratory?—*A*. No.

Mr. A. Chatterton.—*Q*. Although a very large number of sources of supply exist in this country from which to get drugs, you are importing most of the raw material?—*A*. We are in certain cases. It is only where it is not available in India at present.

Q. What do you mean by "available"?—*A*. I mean available in any quantity.

Q. Have you got any special means of identifying these things? Supposing you got these forest plants from which drugs are extracted have you any special staff to identify them?—*A*. I know most of the things myself. I test them or send them to the Chemical Examiner for testing.

Q. Suppose you have got two roots having the same appearance, one being a drug and the other a useless thing?—*A*. I do not think we could make that mistake. I do not know of any medicinal drugs that you cannot distinguish if you are at all acquainted with them.

Q. Supposing that gardens are established in suitable places for the growing of drugs, would the men have any difficulty in selling it to a department like that of yours? Would you say that you had not the means to identify what he had to sell?—*A*. No. Certainly not. If we ask for any particular drug we should know that drug well enough to be able to tell it at once.

Q. If any private individual started a drug farm or garden would he be wise to first get into touch with your department?—*A*. He will certainly have to get an idea of what our requirements are. I have had a question like that. It has arisen in the gardens in the hills. I asked them to grow a certain plot for me and they did grow. Although they could grow, I had to order it from England because of the uncertainty of it.

Q. The point is this. Suppose a man is willing to grow these drugs and he comes to you and says that he will grow these for you, are you in a position to accept his offer?—*A*. Yes. If he will give me the roots and leaves of the real plant, I will take it.

Q. You would be prepared to enter into a contract on that basis?—*A*. Yes.

Q. For long periods?—*A*. Yes. Government would be perfectly willing to do that. If the man produces it we are prepared to take it over.

Q. Have you got anything to do with the distribution of cinchona?—*A*. I get it from the cinchona people and it is distributed through me.

Q. You make up these packets?—*A*. They have asked me if I will make up the hydrochloride quinine tablets. We shall probably take this up.

Q. Do you know whether the local supply of bark and cinchona is sufficient to meet the demands of the various Government departments which deal with quinine?—*A*. I could not tell you now.

Q. Is quinine imported from outside, from Holland and other places to make up the supply?—*A*. Yes. As far as I know in the Nilgris and in Darjeeling too. The Indian quinine has, I believe, never been used unmixed with Java quinine. They are using a larger and larger proportion of Indian quinine as Java quinine is getting more difficult to get.

Q. What is the reason?—*A*. The Java quinine is a more powerful quinine.

Q. Have you any experience to enable you to express an opinion as to the necessity for a Food and Drugs Act?—*A*. I have no knowledge.

Q. You do not purchase from the local dealers?—*A*. No. Very little really. The only stuff we buy are raw materials in which there is no chance of adulteration.

Q. Do you buy extracts and so forth from the firm started in Bangalore?—*A*. Not any. I have been recently taking our sandalwood oil from Mysore. Most of the things that they make we make ourselves.

Q. What arrangements have you got for obtaining alchohol?—*A*. We buy our alchohol from one of the distilleries of Parry & Co.

Q. Duty free?—*A*. Yes.

Q. Does the Excise Department give any trouble?—*A*. The duty is now charged on our preparation. That was brought in about a year ago.

Q. As regards the Indian Stores Department besides drugs, do you deal with instruments? Are those obtained from Europe or do you manufacture them out here?—*A*. They have got a factory now in connection with the Bombay Depôt and they make some of the instruments. We specialise in medicinal preparations.

Q. Is it a Government Factory?—*A*. I do not know exactly what their arrangement is. The factory is run by a gentleman named Mr. Eyres. There is an arrangement between Government and him. On this agreement he makes instruments, etc., for Government.

Sir D. J. Tata.—*Q*. Do you think that the excise duty hampers the Indian manufacturer in any way?—*A*. I think it does where he has got to pay for the loss that occurs in manufacture. There is the loss due to evaporation.

Q. Do you know what is the price of coal tar?—*A*. I have not had anything to do with it. It is difficult to get it out here.

Q. It can be imported?—*A*. I suppose so.

Hon'ble Pandit M. M. Malaviya.—*Q*. What would the equipment cost for making coal tar?—*A*. I could not tell you.

Q. Roughly?—*A*. Ten to fifteen lakhs.

WITNESS No. 242.

HON'BLE COL. W. M. ELLIS, R.E., C.I.E., *Chief Engineer for Irrigation, Madras.*

NOTE.—*The written and oral evidence of this witness is confidential.*

WITNESS No. 243.

REV. J. CAIN, *Church Missionary Society, Dummagudem.*

WRITTEN EVIDENCE.

The darned net lace industry (resembling Limerick lace) is of so limited exte here that we have not experience enough to answer the questions set by the Commissio In passing through Ceylon in 1891 Mrs. Cain was attracted by women in Cotta darnin lace [illegible] and [illegible] thought that the industry might be carried on—in a ve small way—in our Girls' Boarding School. She taught a few girls but very little was done until after the famines of 1896-97 and 1899-1900 when she urged young widows to take it up. She had to find the patterns and material and procure sales. She soon saw that finer net and thread were necessary and new designs as time went on. Other women began to learn as the pressure of high prices made it important for them to add to the family income by other means than precarious coolie work. Gradually the demand grew for a better class of work, such as collars, traillers, fichus, veils, babies' bonnets, handkerchiefs, etc. These all need new designs and careful attention to fashions. So it is not a purely indigenous industry; it needs the superintendence of one alive to changes and vagaries of ladies' fashions and one who can design or direct the designing of new patterns. The two ladies in charge of the work arrange for the cutting out of the net choosing the patterns (according to the ability of the workers), giving the right amount of thread, etc. The workers take the work home and having completed it bring it in and the superintending lady looks at the work, takes notice of the cleanliness or otherwise of the net and bestows what seems to be fair wages. (Sometimes the work is so discoloured and so badly darned that nothing or next to nothing can be given. Unsatisfactory workers drop off or have to be sent away with a recommendation to devote their energies to coolie work.)

All the material comes from England.

The Government recognised Mrs. Cain's enterprise by bestowing upon her in 1909 a silver Kaiser-i-Hind Medal.

The attached pamphlet shows the character of the work.

Extracts from a pamphlet by Mrs. Cain on the Dummagudem Lace Industry.

I began in a very small way among the elder girls of our boarding school when I came to Dummagudem for the first time in 1882. I had often wished in my first years of service in India that the elder girls in a boarding school had something to do out of school hours. They are apt to get so listless and heavy and have too much time to themselves. They cannot be always reading, and they are so poor—seldom have a copper to buy a book—and I used to wonder whether we could not do something more to interest them. When we were in Cotta, Ceylon, in 1882 detained for the steamer, I saw the women and girls all busy darning net, and I thought 'this is the very thing I want'. The ayah taught me some stitches; I was very stupid at it, but she was patient, and she gave me a few patterns roughly drawn on paper. We sent to London for some net and darning thread copied the patterns on thin paper, which we pasted on brown paper, and so began. A few of the elder girls soon learned, but our sales were very limited. The first worker outside the school was a lame Koi boy, the son of the headman of a village near.

Miss Graham, our devoted medical helper, could draw, and she helped us greatly with patterns, and would put my crude ideas straight. Our elder girls married and left school. Some of them kept up the lace work, and now their children are among our best workers. In those days we used to get from England six yards of net and half a pound of darning cotton at a time. We soon used embroidery cotton and then linen flourishing-thread. I used to prepare every piece of work with my own hands, but now we have four girls and a woman constantly employed cutting out and preparing the work. A man draws the patterns on specially ruled paper, but I still have to design and I find the patterns in many odd pieces, leaves and botany books, old laces, fashion plates! We now use about 200 yards of net a week, and have over 700 outside workers, as well as many of the girls working in the school. We use chiefly Peri-lusta Flosette in colours and in white. Our work increased after the famine of 1897. We had a few poor young women who had to be helped, and making work for people spoils them. So I said there was to be no more such help. For one month we would feed them, and they were to learn lace work; and so the lace class began on the verandah. How to get a market was the next thing. Miss Bruce, our zenana helper (1895-99), made the work known among her friends, and, when she went to Darjeeling for the hot weather (1898), got us many orders. So we took courage and went on. Miss Frohlich kept on the work while we were away on furlough (1900-1), and since our return, Miss Wallen has been my chief partner (shall I not say?) by getting sales among her friends, cutting out new patterns, doing all the accounts, giving out work, etc. All the collars, cuffs, etc., have to be cut out exactly, the pattern drawn and then pasted on to strong paper and mounted on thin muslin. Each piece of work has to be folded up in newspaper and given to the worker. Friends have been most kind in sending us newspapers. The workers are nearly all very poor, and live in huts of one room, where everything is done, cooking, eating and sleeping. How they keep long pieces of work clean one can hardly understand, but we are so thankful that they can do their work in their own homes. At times it is amusing to hear an old worker explaining to a new one how to keep her work clean. 'You must buy a piece of soap; you must keep a clean rag near you; if you stop your work to wipe the perspiration off your face you must wash your hands again; if you scratch your head you must wash your hands; if you take up the baby you must wash your hands' and so on. One of the Christians, enumerating the good of lace work, said: 'It is good for three things, it gives us money; it keeps our wives from [illegible] they have no time to be running to the neighbours' houses; and it makes them clean.

In the boarding school it is a great comfort to me. We pay the girls a little for every piece done well, so that they have some money wherewith to buy books and to put in the collections. Some of the older ones have saved enough to buy a cow by the time they married. They are so proud of having their own books, bought with their own money. The first thing that a girl saves up for is a Bible. As for the poor women who work, they say many would have died had it not been for the lace. Some, who formerly lived by begging, now earn enough to support themselves and help other members of their families.

We seldom teach any new worker now, and have quite given up the learners' class. One worker teaches another, and, at times, it is quite piteous to hear would-be workers say: 'I can do flowers and leaves, please give me just a little bit of net to learn on.' 'No, no,' I say, 'new workers mean more pins, more papers, more needles, more strength on our part, and more ladies who are willing to buy.' 'Ah! but we are so poor, just give to me.' Sometimes I give in, but generally we are obliged to turn away would-be learners.

There are about 700 workers, who were paid last year Rs. 27,176-2-0. I think the lace workers gave more than Rs. 700 last year in thank offerings. To the war fund they have contributed their share earnestly hoping that their annas will help towards the speedy termination of that calamity.

We have been wonderfully helped in our sales. Friends, known and unknown, in all parts of India, Great Britain, Canada, Australia and New Zealand take boxes of lace and show them to their friends who in their turn take boxes.

We have had two bronze medals and four silver medals from the Industrial Section of the 'Fine Arts Society's' Exhibition in Madras, a silver medal from the Indian Christian Exhibition, in Madras, 1902, a silver medal from the Education Exhibition, Madras, 1907, the fourth best collection of lace in the National Congress Exhibition in Bombay, 1904, a bronze medal at the Industrial Exhibition, Nagpur, 1909, a bronze medal at the Mysore Exhibition, 1912, a money prize at the second Exhibition, 1913 and a gold medal in 1916.

The majority of our workers are Christians, but we allow others to learn, and would let many more were it not for the fact that we have not enough time or strength to instruct them. We make arrangements for all to have some Christian teaching. We have about one hundred Kois who work beautifully, most of these come to church. The Kois are an aboriginal tribe who live in the jungle and are hard-working rough cultivators. The women help their husbands and also cut firewood and bring it in for sale from door to door. Their hands are hard and horny in the extreme, and yet some of them do the lace work most cleverly and keep it clean in a marvellous way. Except a few whom a teacher's wife visits during the week, the caste women attend a Bible class on Sundays.

NOTE.—*Witness did not give oral evidence.*

WITNESS NO. 244.

MR. T. SAMSON, *Proprietor, Dhaugam Oil Mill, Ganjām district.*

WRITTEN EVIDENCE.

Immediately after the termination of the South African War, through which I served in the Imperial Yeomanry, I came to India and joined a very old established firm in Calcutta and, in 1908, took over the management of the Aska Sugar Works and Distillery and remained in that capacity until the end of 1914, and then made arrangements to erect this mill on a small capital, being under the impression that my oils, to be sold under a guarantee of purity, would find a ready market at rates at least equal to the adulterated oils so much consumed in this district and throughout India.

I however found out that it was just the reverse and it was then necessary for me to choose between one of two courses, viz., (1) to remove the guarantee of purity, or in other words, adulterate and supply the sweet oils preferred by the public and at good rates, with a maximum profit and working on a small capital, or (2) to continue the guarantee of purity, increase my capital to enable me to keep the mill working almost the whole year which would be necessary, dispose of the oil at the low rates offered, profit as in the first case and at the same time, lead the way in supplying a pure and wholesome article for consumption.

I decided that the latter course was the correct course to work upon and as my guarantee of purity carried conviction to the purchaser and consumers, I found a good demand. My difficuties then commenced in the matter of increasing capital. The Bank of Madras would not give the usual assistance in financing upon the security of my stocks. I then discussed the matter with a local Raja and a Zamindar, as both their estates adjoined this mill, but was unable to persuade either of them to take the necessary interest. Considerable Indian capital is available in this district but the holders are very backward and accordingly hold unfavourable views regarding industries as a form of investment. I am however inclined to believe that had Mr. Tressler, the then Director of Industries, Madras, instead of sending his Personal Assistant (for reasons which will be seen later) inspected the mill himself and enquired into the local conditions and the excellent prospects offered, which my figures prove, he could have given a most favourable report and this would have acted as a stimulus as in the case of the United Provinces, the local finance would have been forthcoming.

Being close to Rangoon, the oil (gingelly and ground-nut) much of which is now sent to that port from Bombay, can be shipped from here and I have received an excellent report upon my samples from that market from a European firm, if the oil is sold under a guarantee. At the same time, this mill is situated in the heart of a produce district and has enormous scope for expansion.

Before selecting the most suitable class of machinery for a small capitalist, I communicated with the Director of Industries, Madras, who was then testing a plant almost new to the East. His replies regarding this plant were so satisfactory, that I decided to instal the same and he further offered to supervise the erection for me. After a very short test, I found the plant unsatisfactory. Mr. Silver, Director of Industries, United Provinces, having been informed of the class of machinery working here, wrote to me for my opinion, which was given, and he, when acknowledging receipt of my letter, stated that the same confirmed all he found when making enquiries into the capabilities of this make of plant, and that he condemned the same, first merely upon the description given, and subsequently confirmed this upon expert examination.

The Director of Industries, Mr. Tressler, recently sent his Personal Assistant to compare his working results with mine and I now understand that he, after giving the plant a very long testing, finds the same unsatisfactory. His Personal Assistant gave me some information regarding the working methods adopted by him with this plant in Madras, and the high prices there for his gingelly products. As this information seemed somewhat eratic, I wrote to Mr. Tressler on June the 7th; and sent a reminder on the 11th August to know if it was correct or otherwise, as I wished to work my plant for a time on similar lines and could export my products to Madras, but up to the present have received no reply from him although a period of four months has elapsed.

I mention this as any information or advice given by the Department of Industries should be reliable and sound enough to work upon, as no doubt the time will soon come when new, especially small, industries will be guided entirely by the advice of these departments and the results may be very serious indeed, as in my own case, if such conflicting and misleading advice and information is given.

I should here like to record the assistance and advice of a very sound nature always so promptly given to me by Mr. Silver, Director of Industries, United Provinces, and in this connection it is interesting to note from his Annual Report for 1915-16, that the Local Government there has been given financial assistance in the case of a large oil pressing mill to enable it to instal new and modern machinery with a much increased capacity.

If this mill was assisted with finance to the extent of a maximum of Rs. 50,000, most of which would be on the security of stocks, it would enable me to use the present plant for the first pressing only and to add presses for the second extraction, instead of renewing the whole machinery, and the concern would then be on a sound footing, but in the present circumstances it will be necessary for me to close down the mill almost immediately. My loss is considerable but unimportant as compared with the wrong, but nevertheless, bad opinion that will be held of this industry, and that the very one that the Government of India are doing so much to promote just at present.

The foregoing information is brought to your notice with the hope that the same may be of some assistance to your Commission and that others like myself who have settled down for many years in the East and who are sufficiently enterprising and interested in the country to use their own capital in opening up new industries in the backward districts, will, in the absence of financial assistance from the bank, receive the same from Government on similar lines.

Note.—*Mr. Samson did not give oral evidence.*

WITNESS NO. 245.

MR. F. A. COX, *Engineer and Manager, Messrs. George Brunton & Co., Cochin.*

WRITTEN EVIDENCE.

Financial aid.

Government aid is undoubtedly required for the purpose of establishing new industries financed by Indian capital until new industries are successfully developed to such an extent that public confidence is established in such concerns.

Where Government help is required the scheme should be investigated by experts preferably connected with the Department of Industries and if they are satisfied that the proposals are sound only such aid as would be sufficient to induce the public to invest in the concern should be granted according to the special circumstances of the case.

As regards the manufacture of machinery granted that the figures and estimates on which the scheme is based are approved by the Government experts, capital would be attracted by—

1. Government guarantee of interest say for five years with or without refund.
2. Provision of sufficient share capital to nominate a Director on the Board.
3. Government promise of purchase of products as long as quality and price are maintained at a satisfactory standard.

Government control should be limited to certain powers vested in the Director representing Government on the Board to prevent ill considered experimental or speculative measures being adopted.

Training of apprentices.

In a Government aided concern further aid should be granted for the theoretical and practical training of apprentices as the successful development of the manufacture of machinery in this country depends entirely on the supply of well trained, efficient, skilled labour from fitters and machinists to engineers in charge.

The foundation of a mechanical training should be based on the practical training in a successful commercial machine and fitting shop. Apprentices should serve at least for two years in the shops and during the same time attend compulsory classes in elementary mechanics. The classes to be conducted under arrangement with the Technical Education Department in the class rooms to be provided for the purpose attached to the Works. Competitive examinations to be held at the end of two years for Government scholarships to enable students of ability to complete their theoretical education. Those unable to obtain scholarships would be well trained mechanics with sufficient theoretical knowledge to enhance their usefulness.

Mechanical training on these lines is essential to the successful development of manufacture of machinery by Indians. At present Indian workmen are very quick to learn, have undoubted skill but cannot be relied on to maintain a high standard of work without constant European supervision. The same degree of efficiency that has been instilled in the Indian soldier by the strict discipline and the insistence of a high standard by British officers can also be effected in the Indian workmen.

Direct Government aid and control are not advocated as general and permanent measures but only in cases where new industries are being started to give confidence to the Indian investor.

The first, most important, and permanent measure to be adopted for the encouragement of Indian industries is the adoption of a well considered scheme for the training of mechanics and those who would fill positions of responsibility, a training that in time would eradicate the tendency to a want of sustained effort in efficiency. This training can only be acquired under the discipline and control of commercial works where efficiency and constant endeavour are enforced and where alone the experience can be gained which is necessary to solve the various problems that have to be dealt with by every grade of worker in such concerns.

In limiting my answers to the various questions concerning financial aid to industrial enterprises and the training of apprentices I do so as they are the only subjects of which I have personal experience.

I am Manager of Messrs. Geo. Brunton & Son, Engineers, Cochin. We have trained apprentices for years both in our Foundry and Workshop in fact the whole of our foundry hands have been trained in our foundry by our foundry manager Mr. G. Bailey and all our machine hands and fitters have been trained in our workshops and we are now turning out oil engines and other machinery which are competing successfully with imported articles of the same description.

From many interviews with influential Indians I am convinced that given well trained labour and a certain amount of skilled European control, which at present is necessary especially in the machine shops and foundries, industries founded on the lines I have pointed out would find support from Indian capital.

ORAL EVIDENCE, 2ND FEBRUARY 1917.

Sir F. H. Stewart.—*Q.* You are Engineer and Manager of Messrs. George Brunton & Son?—*A.* Yes.

Q. Where is your firm established?—*A.* Our [illegible] but we have branch Works in Aleppey and Trichur.

Q. How many years' experience have you in your [illegible]?—*A.* Thirteen years.

Q. I see you refer to having trained apprentices. Have you any definite system of training?—*A.* No. *A number of applicants are always coming in to be trained as fitters and turners and we take them on and generally for the first week we try them and then they stop with us for one year or two years or three years and when they have begun to do useful work, we start them on pay.*

Q. Have they any previous knowledge?—A. No.

Q. After a year or two you start them on pay, do they stay on with you or do they go away?—A. Some stay on with us, but a good many have got work up country in Bombay and other places. On the results we give them certificates and with them they get work.

Q. Have they got any aptitude?—*A.* Yes. Very great. A lad of fifteen will learn work in a month which apprentices at home would take about a year. They pick up very quickly, but they have to be strictly supervised the whole time.

Q. Is that about the age they come to you—fifteen years and upwards?—*A.* Yes.

Q. And you get them in good numbers?—*A.* As many as we want.

Q. How many men do you employ in your works?—*A.* In our workshops 70, in the foundry 30 and in our branch works according to the number of contracts out. We have about 30 apprentices always.

Q. What is the highest they can rise to be with you?—*A.* The highest pay of apprentices in the way of steady wages is about Rs. 12 to 15 a month, but we have bonus and contract systems by which they make more money. Instead of increasing the wages we do a lot of our work by piece-work. They have a steady wage and if we have a repetition job, i.e., a good many articles of one pattern we give it out on contract to the men and some of them make a good lot of money.

Q. They can rise to be foremen?—*A.* Yes. We have a foreman who gets Rs. 60 and the man in charge of machines gets Rs. 30.

Q. The ordinary mechanic gets how much?—*A.* In Cochin it is about ten annas a day or twelve annas.

Q. Do you give training in theory as well as in practice?—*A.* No. That is what I should like to see done.

Q. Do they manage to acquire it for themselves?—*A.* Some of them do. We have one in our shop who evidently studied at home. We give a bonus for making improvements in machines and one or two have come out with improvements.

Q. One or two have shown a faculty for inventions and improving the existing machines?—*A.* Yes.

Q. Do they understand English?—*A.* Yes. A good many of them can just read English. They have been educated enough to read English.

Q. To read a technical book is rather difficult?—*A.* That is, of course, difficult. One of our lads understands the general theory of, say, oil engines.

Q. In your last paragraph you say, "From many interviews with influential Indians I am convinced that given well trained labour and a certain amount of skilled European control, which at present is necessary especially in the machine shops and foundries, industries on the lines I have pointed out would find support from Indian capital." That is your experience in this part of the country?—*A.* Yes.

Q. You have had no experience elsewhere in India?—*A.* No.

Q. You think that that would be the case without direct Government assistance?—*A.* I think Indian capital would come forward if a concern were run under expert European control at present.

Q. The direction in which you would like to see Government assistance given is in the way of technical education and training?—*A.* Yes.

Q. Would that be made simultaneous with the work in the shops?—*A.* Yes. As far as we are concerned, we would give apprentices two hours during the day to attend classes.

Mr. C. E. Low.—*Q.* There is one particular point that I want to follow up specially. You suggest, "The foundation of a mechanical training should be based on the practical training in a successful commercial machine and fitting shop." Of course, you could only have that with a good first class concern?—*A.* Of course, to an extent. But the past experience is, that it is best for them to attend a general repair shop to gain general experience.

Q. But you want to add to the concern some classes to give theoretical training as well?—*A.* Yes.

Q. It would not be possible to do that except in a big workshop when you have got a fair number of apprentices?—*A.* No. But it could be done in a good many places with Government aid. The idea is that it will be a condition of Government aid, to train apprentices.

Q. I should imagine that engineering concerns, as a rule, are less likely to require Government assistance?—*A.* We would welcome a system like that, because I take it that it would be an asset of the firm to have a steady supply of well-trained labour to extend the business. Government help in training apprentices would be valuable if it stimulated their ambition by the grant of scholarships. The present apprentice sees nothing before him but to become a good workman or possibly foreman. We want men trained to be able to carry on and extend our business in various capacities.

Q. How many concerns do you think on the West Coast would be capable of taking in enough apprentices to make it worth the Government's while to add a school with classes for theoretical training?—*A.* On the West Coast there are only two engineering firms.

Q. How many apprentices could you take in if Government put down classes at your door in the way of theoretical training?—*A.* We could take 40. We have now about 30.

Q. What class of work do you do? You do general repairing?—*A.* Yes.

Q. Do you do anything with ships?—*A.* Odd jobs for ships that come along.

Q. What other work do you do?—*A.* We make oil engines and pumps. We drain large areas.

Q. You are actually making oil engines?—*A.* Yes. We turn out oil engines up to 30 horse-power.

Sir D. J. Tata.—*Q.* What class of men do you have as apprentices? Are they local men?—*A.* We have had all classes.

Q. Of local people? From what class are they drawn?—*A.* From all classes. We have had Brahmins, and we have had Sudras; but the greater number are probably Roman Catholics. They are more or less about the same as the Mappillas.

Q. Before they come to you have they had any experience of any kind?—*A.* No, unless at home some of them are sons of carpenters and so forth.

Q. Is there a mechanical population of any kind in this neighbourhood from whom you draw your apprentices?—*A.* From the general population about Cochin.

Q. Before you came here, there were no industrial works of any kind? There were local carpenters?—*A.* There were skilled artisans.

Q. And it is from that class that you draw your apprentices?—*A.* Yes, chiefly.

Q. I heard you say that they know very little English?—*A.* Most apprentices know just enough to read and understand instructions.

Q. Who are the instructors and foremen that you employ?—*A.* All natives. We keep control over the thing. In the foundry we have an Englishman in charge, but he has his foreman under him and we have some in our works.

Q. So, how many Europeans have you under you?—*A.* Only one.

Q. You talk of Mr. Bailey?—*A.* He is in charge of the foundry.

Q. He has not studied the vernaculars? He communicates with his work people through the foreman?—*A.* Yes. We have about 70 men in our machine shops, and 30 in our foundry.

Q. And those men who are helping you in the workshops and in turning out oil engines—would you leave them entirely in charge of making oil-engines; or are they capable after some experience to carry on the work entirely themselves?—*A.* Not yet. They have not had the responsibility. They have not the sense of responsibility.

Q. They will work under instructions very well, but the moment they are left to themselves?—*A.* They are apt to get off.

Hon'ble Sir R. N. Mookerjee.—*Q.* What is the rate of wages here for labourer, carpenter, blacksmith and fitter?—*A.* Carpenter about annas twelve.

Q. For an ordinary labourer?—*A.* Eight annas.

Q. Blacksmith?—*A.* Ten to twelve annas.

Q. And fitter?—*A.* It varies. Some of our fitters have twelve annas and so forth. They would have higher wages if we had not the system of bonus and contracts.

Q. That is in your firm, but generally?—*A.* It varies according to locality. In Madras and Bombay it is very much higher. Wages are going up.

Q. Can you tell us how much?—*A.* In the last few years it has risen about, I think, 30 per cent.

Q. You are referring to town wages?—*A.* In Cochin.

Q. In the villages?—*A.* We get no fitters from other villages.

Q. In the Tile Factory, I understand, the cooly labour is four annas a day, or three annas and nine pies?—*A.* It is up in the country. I do not know.

Q. You do not pay eight annas?—*A.* Yes for coolies at times. If there are ships in they can get eight annas and more by shipping cargo. I do not know about the rates in Feroke. My works are in Cochin.

Mr. A. Chatterton.—*Q.* I should like to get from you some idea of the prospects of mechanical engineering along this coast. What work is now done and what prospects there are in the future. You have alluded, in your replies to the President and to Mr. Low, to the fact that you are engaged largely on drainage work. I think it will be interesting to the Commission if you will briefly describe to what extent mechanical appliances are being used in this system?—*A.* In Travancore and Aleppey there are large areas of submerged lands. About thirty years ago mechanical pumps were put up by Mr. Brunton and he started to drain all these lands for cultivation. Before that ordinary scoop wheels were used for small areas just on the fringes of the submerged lands. Now we have about 15,000 acres under pumps besides which other firms are engaged in the business both Indian and European which would raise the area to 25,000 acres.

Q. What depth of water is there on the submerged land?—*A.* The maximum depth is six feet.

Q. Have you got bunds?—*A.* The field owners put up clay bunds round the land they require. The clay is very good and water tight.

Q. What type of engine and pump?—*A.* We use our own make. It is a sort of screw pump invented by Mr. Brunton. It is not a continuous screw. It has a vertical spindle with six blades.

Q. How many pumps are used on the coast?—*A.* About 60 pumps.

Q. They are all driven by oil engines?—*A.* Partly steam and partly oil.

Q. And they give rise to a certain amount of mechanical engineering work?—*A.* Quite a big demand. People are now wanting our engines and pumps.

Q. Are there any further areas to be taken up?—*A.* They are taking up more in the Aleppey lake.

Q. Is this cultivation fairly profitable?—*A.* Very. One good crop pays for the whole of the bunds or initial cost of enclosing an area.

Q. On what terms is this pumping done?—*A.* We give our pumps at so much a pump for draining water and all wages are paid by the contractor who hires a pump.

Q. How long does pumping go on?—*A.* We start in November and finish at Aleppey in December, and we then bring over pumps up to Trichur and go on till March.

Q. Are there many saw-mills on the coast?—*A.* Not many. There is one in Cochin and one in Trichur and one or two in Malabar.

Q. There is a large business done here in extracting cocoanut oil?—*A.* Yes.

Q. Are there many Indian owned mills?—*A.* Quite a lot.

Q. What type are they?—*A.* Rotary mills.

Q. And they are working with steam engines?—*A.* Yes.

Q. Is the development of the extraction of cocoanut oil on the increase or stationary?—*A.* About stationary in the last few years.

Q. As regards labour, formerly, there was shipbuilding here?—*A.* Yes. Now not shipbuilding, but the building of smaller pattamars and native sailing craft.

Q. Are steam or petrol engines much employed in the backwaters?—*A.* We have been importing a good many petrol engines in the last few years.

Q. I suppose most of your work-people are the descendants of the old shipwrights?—*A.* Yes. They make a most excellent class of shipwrights. We are sending boats to Mesopotamia and they were built by the descendants of those shipwrights and they seem to be very much pleased with the boats there. The boats, etc. are built of teak. The workmen are an excellent class of boat builders.

Q. Are there many of them available, or is the supply dying out?—*A.* There are a good many available.

Q. Do these men migrate to other places for work?—*A.* Yes, a lot of them get work in the hills under the planters and so forth.

Q. You have taken up the manufacture of oil engines in your works?—*A.* Yes.

Q. How many have you built?—*A.* About ten large ones and we are experimenting with others now. We are building for the pumping only. We have sold two outside, one to Messrs. Shaw Wallace & Co., Cannanore and one up in the hills.

Hon'ble Sir R. N. Mookerjee.—*Q.* Not under normal conditions? Can you compete in normal conditions?—*A.* Yes. In normal conditions the market price would be Rs. 3,000 net. The highest rise of rate we have had so far is 30 per cent on petrol engines.

Mr. A. Chatterton.—*Q.* For steam plants do you use coal?—*A.* Wood and coconut shells.

Q. How do the people here in the oil trade obtain for barrels for shipping oil?—*A.* They make them locally. All the firms make their own casks.

Q. On what scale do they work?—*A.* On a very large scale. There is a big shipment of cocoanut oil. They make their own casks from white cedar entirely.

Q. There is no proposal that you know of so far to put up steam or mechanical engines for doing this work on a bigger scale?—*A.* No.

Q. Do you make machinery for tile presses and tile factories?—*A.* Yes.

Q. There is a fairly wide range of work here?—*A.* Very wide.

Q. With this miscellaneous class of work up on the coast, is there any difficulty about getting sufficiently well trained men to supervise the running of the machinery?—*A.* There is no difficulty. We have supplied several drivers to the different factories, to look after power plant as well as machinery for rubber and tea.

Q. You train men specially for this supervision work?—*A.* Yes. We also train a lot of motor drivers too for motor busses.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* You employ from thirty to forty mechanics?—*A.* 70 in our workshops.

Q. Where do you get these men from? From any engineering place?—*A.* All our men have been trained locally.

Q. Excepting the foremen?—*A.* The foremen too. They have grown up in the place.

Q. No theoretical training?—*A.* No. They have not picked it up.

Q. And out of these 30 or 40, how many draw more than Rs. 100?—*A.* None of them.

Q. In the last sentence of your note you say, 'From many interviews with influential Indians I am convinced that given well trained labour and a certain amount of skilled European control which at present is necessary especially in the machine shops and foundries industries founded on the lines I have pointed out would find support from Indian capital.' Why don't they start then?—*A.* What I have gathered is that they are beginning.

Q. Do you think there is scope for other concerns to start iron works here?—*A.* I think there is a big scope for it on this coast.

Q. They do not belong to any one caste? Do they belong to all castes?—*A.* Yes, the bulk of our workers is from the artisan class. We have had all sorts of castes. Even the high caste people come to us as apprentices, but they are generally better educated, than the others, that is, up to the matriculation, and they come in just to get experience before they go out to take up appointments. The great bulk of our apprentices is from the artisan class.

Mr. C. E. Low.—*Q.* Do you import your raw material for your gas engines, or how do you get them?—*A.* We cannot get them out now. Before the war we imported our iron and coke from England, but now we are getting it from Tata's.

Sir D. J. Tata.—*Q.* Do you find it suitable?—*A.* I have hardly tested it yet. The coke is not bad. It is liable to make the castings a bit hard.*

Q. You talk of your apprentices being drawn from the artisan class and also from the educated classes and you say that some of them have gone up for the matriculation. Do you find any difference in the skill of these, or in the way in which they acquire knowledge? Does the educated class answer better, or is it in any way more satisfactory or less satisfactory?—*A.* We have been rather fortunate in the higher castes that go through our shops. They have only come for the purpose of getting their training, and they have gone through the work from the beginning without any grumble.

Q. There is a new spirit over the land?—*A.* Yes.

Q. And those people who are trying to go in for industries are putting their heart into the thing?—*A.* Yes.

Q. And you think that in course of time they will turn out better workmen than the artisan class who are not so well educated?—*A.* I would not say better workmen. They have more intelligence and they would probably fill the higher posts, that is, for the work of supervising.

Q. Their mechanical skill is naturally not so good as that of the artisan class?—*A.* I could not give a definite opinion. It depends on their individual ability.

Q. They are taking to manual labour?—*A.* Yes.

WITNESS No. 246.

MR. G. F. BAKER, *Manager, Henke's Tile Works, Feroke.*

WRITTEN EVIDENCE.

The great difficulty in raising capital in this country is the want of an efficient directorate. I have seen companies formed for mining and industrial purposes where either the directors did not inspire sufficient confidence to induce the capital to be fully subscribed or they had no knowledge of the business.

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*Since giving evidence we have tested the pig iron from Tata's Works and find it excellent even for motor cylinder castings.

Government control could be exercised in preventing companies going to allotment on insufficient capital and where the industry is new, the specifications for the plant, plans, etc., should be passed by the Industries Department who, if they had no expert in this country, in that subject, could submit them to known experts at home whose services would be at the disposal of the Government and for which valuable assistance, reasonable fees might be charged.

I have seen a mining company allowed to spend over a lakh of rupees on a concentration plant which was set up 120 miles from its mines, although 40 per cent of the ore was waste. It was never used and the company which would have paid had it confined itself to mining, went into liquidation.

Had this company been obliged to submit its plans to any engineering expert this waste of money would have been prevented.

The Indian Institute of Science might investigate new schemes in conjunction with the Director of Industries who would be assisted by a Board. A scale of fees could be charged to private firms and companies. If their report and the report of the home expert were attached to the prospectus, it would inspire confidence and if the directorate was also sound there would be no difficulty in raising the necessary capital.

In my opinion the Indian merchants, more especially Muhammadans, are most ready to invest in new ventures. Those Indians who have made their money in contracting are very ready to invest in industrial concerns. The wealthy landlords, who have their money locked up in real property, are not so ready to invest unless they have complete confidence in a concern. The merchants and contractors and perhaps the lawyers are more ready to risk their capital. Much good may be done by training the sons of wealthy men, who are anxious to get their sons on in life and acquire special knowledge useful to their own business. The Indian Institute of Science, I believe, provides the use of new and up to date plants on a small scale and these should be demonstrated by experts and instruction given both in English and the Vernacular. The Institute of Science, I suggest, might extend the scope of its usefulness by throwing open its classes to youths whose fathers are able to pay for such practical instruction even if the sons are not graduates. The Colleges and Technical Institutes may also send to Bangalore youths whose means will enable them afterwards to make use of the knowledge thus gained. In this manner capital will be attracted to industrial concerns and it will come from men who can make the best use of it.

One industry which in certain places is becoming overdone is tile manufacturing. Although the demand for the tiles is good the factories are situated too close together and in consequence the labour is becoming scarce both at Calicut and at Mangalore. There are other places on the coast where labour is more plentiful and where the clay and fuel are as accessible. Government could assist by a survey for this particular object and by reporting on those places which seem most suitable.

Government assistance.

I am in favour of assistance by Government to be given to any new industry either by bounties or subsidies or by guaranteed dividends. Loans can also be granted with interest and where Government is a large consumer of the products made by the new company orders should be guaranteed. All assistance should be accompanied by Government control not only by appointment of Government Directors but also by compulsory advice by experts both as to the minimum capital and the plant required. The Government Directors should only be appointed for the period during which assistance lasts.

Pioneer factories.

The great success of the Madras Aluminium and Chrome Tanning shows how pioneer factories can be employed to establish industries.

Government aid to a new industry should not be such as to convert it into a monopoly ; when the industry has been proved it may then be worked by a private company.

With regard to industries for which co-operative societies may be encouraged I believe that no industry lends itself better to this than rice mills. A number of land owners, at a distance from rails, can band themselves together to start either a number of small hullers or a larger mill. Such an association might be given loans by Government at a low rate of interest or better still provided with the machinery on the hire purchase system. Other machinery such as small power presses for oil hullers for ground nuts, pumps for wells or automatic rams for taking water from rivers might also be purchased by such small societies.

Government aid to a new industry should not be limited by the claims of an established external trade with which it completes. Where possible, Government orders bounties or subsidies should be given to enable it to compete with the greater output of its European rival.

The industry should not however be encouraged to start if in the opinion of experts it cannot be expected to compete without being heavily subsidised at the expense of the Indian Government and to the detriment of Imperial interests.

Might be of great service in acquainting the people of each district with the value of the products which it contains, small collections might be exhibited in every centre giving samples of the minerals likely to be found there and their values also, the finished product of the fibres indigenous to that district, etc. (For instance it is quite possible bauxite may be found in Malabar, but as no one knows what it is like it cannot be identified).

Exhibits might also be exchanged, samples distributed and discoveries reported to a central bureau, which will arrange the exchange of exhibits, loan collections, etc. This bureau can report to the Imperial Institute which will place the samples of minerals fibres, etc., before the trade at home.

Many discoveries of value to the Empire are left to private enterprise to make known to the trade. Assistance from such a bureau would be of the greatest value to the prospector or inventor who has to take but a small share for his trouble and generally finds that he is in the hands of a powerful ring of dealers and middlemen who control the market. I know of mines of high grade chrome, (so necessary to the steel required for shells, etc.) close to rails and within a few miles of electric power, but the owners cannot get in touch with direct consumers, who would put in capital to work such a valuable deposit. They have to work through dealers and their output is far lower than it ought to be. Every ton can be sold twice over, but until the mine is properly equipped ,the output is limited.

Exhibitions.

Can serve the same useful purpose and by medals and prizes for original ideas or finished products small industries may be encouraged and large concerns secure free advertisement. The Mysore Dusserah Exhibitions have brought many inventions to the notice of the ryots—agricultural implements, pumps, etc. In order to induce a good attendance, exhibitions should comprise cattle shows and should be made popular as well as commercial they should be held once in two years. The museum bureau might arrange loan collections, prizes might be given for collections of samples, fibres, minerals, timbers, etc. Subordinate District Officers should also be encouraged to make such collections.

Rare minerals of great value exist in South India and only await identification. Vast wealth is thrown away in waste products, such as plantain fibre. The large cocoanut area in Malabar is capable of development by central factories. Provided that plant can be erected at once, it would seem that there is an opening for *ground nut crushing* as with the high freight which must obtain for long after the war the saving in freight by shipping the oil and cake separately and the cheap labour will enable Madras to compete with Marseilles. This might be a pioneer industry, for it will require hereafter powerful support.

Another industry successful in Ceylon, is dessicated cocoanut manufacture. Here might be an opening for a small demonstration factory in Malabar, as I believe the business is a profitable one although I have no knowledge of its details.

Until an electric power scheme has been started in Madras Presidency it is useless to speak of the possibilities of the electric furnace, electric nitrogen and kindred industries. Paper pulp is being made from the Travancore grasses but there is no attempt to use the bamboos which, though not as plentiful as in Burma, still can be found in large tracts close to water and combined with fibres from some of the soft woods, the pulp would find a ready market in Calcutta.

Trade representativ

Trade representatives sent to other countries, should be paid by the State, their duties should be to bring the Indian products into notice working in conjunction with Indian merchants and the Imperial Institute. They would deal with the larger questions, finance, freights and customs tariffs. The appointments, I suggest, should be given to, and would bc sought by business men of proved ability, who would be enabled to retire from the East while still capable of useful work.

Increased banking facilities for finance of products, such as manganese and chrome ore, etc., where the freight and rail freight form such a large proportion of the c.f.i., cost, seem to be necessary. In my experience, before the War, no single British firm either here or at home, was prepared to pay cash at the mine for these ores, while the German houses were ready to do this as they were backed up by their banks and by their Government. Every pound of wolfram produced in Burma before the war was bought up by the Germans who advanced large sums for the working of the mines.

The final payment was made on the result of the Government analysis in Hamburg.

The Indian mine owners have no such high authority to decide values. The buyers at home draw samples ; in case of dispute it has to be submitted to three analytical experts. This cumbersome system ought to be abolished. Samples should be drawn by sworn samplers, as on the Continent and their sealed samples tested by Government whose decision would be final. The small seller from India generally has to accept the home analysis, it may be reliable, but all depends upon the *sampling*. This is a matter where the Indian Government could have its own representatives though it is an Imperial question as it affects the Colonies as well as ourselves.

Government can also arrange for reports on mines being made and assist mine owners to raise sufficient capital from banks, if those reports are favourable, in order to equip the mines and despatch the ores to port of shipment, provided the banks are secured by the value of the output.

Land policy.

With regard to land policy some measure of protection to new industries should be given in Malabar by assisting them to acquire a title to their land.

In the particular industry with which I am now connected very little skill is required from the labourers nor does it call for much training from the maistries, but some instruction in the principles of ventilation, heat and moisture would be of very great value, and such men could command higher wages, as they would work mor scientifically and not as at present.

Adulteration

There is no doubt that by adulteration much loss is caused by the ryots both t themselves as well as to the trade in cotton jaggery beeswax, and many other product I do not see how legislation can control this, the remedy is in the hands of the buyers If however certificates of quality were granted on which these products could be bough this would go far towards solving the difficulty.

Waterways.

With regard to *waterways* I desire to draw attention to the state of the Beypor river. The bar is silting up and I beg to suggest that Government send a dredge to straighten the channel where several lighters have been lost. The sides of th opening should be strengthened. The Railway land all their coal here in normal time and there is much traffic.

Teak plantations of over a million sterling in value are at Nilambur, some 40 mile up the river. I believe improvements to the river are to be made but until these ar done it is almost impossible to get large quantities of timber down except when th river is in flood. It should be made navigable and would prove a magnificent waterway

Notes on Tile Works.

Terracotta tiles being heavy and fragile are costly to convey and it is therefor necessary to bring the raw materials to the works rather than to establish them on th clay fields.

Tile works should be situated at convenient centres for distribution of the finishe products by rail or sea. As the clay and firewood must be cheaply conveyed the are best situated at the mouth of a river. When the cost of fuel increases on this coas the tile works will have to alter their kilns to burn coal which can be brought i normal times very cheaply from Bengal. By the use of high chimneys or force draught waste products like sawdust, paddy husk, fibre waste, etc., can also be burn with advantage.

With regard to the establishment of new tile works, I consider that the capital o any works should not be less than a lakh of rupees. Smaller units will not pay unles the place where it is proposed to build the works is isolated and far from rails or th cost of transport from existing tile works is so great as to make it possible to charg a good rate to a limited market. The site of the works should be flat to admit o easy conveyance of the clay, etc., and rails should be laid in every part . Eve where the installation of mechanical transport is more costly compared to cool labour, the inevitable rise in the cost of labour will repay this in time while the speedin up of the works is facilitated. On the West Coast, the difficulties of dryage are s great that during the dry weather, when natural drying is possible, it is necessar to increase the output by every possible means and it would be advisable to wor extra presses and pugmills both night and day so as to take full advantage of this an keep the kilns full and moving quickly. It is often better during the monsoon to close one of two kilns and work only one because the same drying halls which would have kept the two kilns going quickly during the dry weather, will then only serve one. The plant should be designed for the dry weather working. Much can be done by means of steam floors and drying tunnels, worked by forced draught and electric fans.

The gradual exhaustion of the clay fields on the West Coast at Mangalore and on the Beypore river is only a matter of time and it would well repay Government to undertake investigations of new rivers with their surrounding clay areas which should be reported on by the Geological Department and samples taken by boring for analysis. Now that the rubber companies are competing for the labour which must in time be drawn away by them, I anticipate that costs will greatly increase.

I have been informed that there are clays in Cochin which would be worth shipping home as ballast in normal times. The clay on the Beypore river is of exceptional quality but it must be exhausted in time. It is seldom found more than two yards in depth after removal of about 18 inches of decomposed soil. I calculate that these works require an area of about 3½ acres annually and as there are now four works here the clay area will be very quickly used up and the companies will have to go further and further up the river.

Stores and supplies of these works were formerly German made, but we have now substituted British goods.

Witness here gave confidential evidence.

Glass tiles, moulded to match the Mangalore pattern clay tile, were formerly procured at very cheap rates from Austria. These are not made in England, but I hope to get them from the Madras Glass Works lately restarted by the Department of Industries.

Glazed Wall Tiles were formerly made in Bremen from the Cornish Kaolins and even then they could compete with the British article.

We may procure our supplies from the United Kingdom.

ORAL EVIDENCE, 2ND FEBRUARY 1917.

Sir F. H. Stewart.—*Q.* You have not been very long in this part of the country?—*A.* For only about two years.

Q. Did you know anything about it before?—*A.* I was connected with the industry before, when I was in Bangalore.

Q. You are not an expert?—*A.* No, I had managed the tile works for a month or two at different times.

Q. What experts have you?—*A.* No experts.

Q. Is there anybody except yourself?—*A.* No. The business is easily carried on.

Q. Your foremen and supervisors have grown up with the works?—*A.* Yes, and they have a knowledge of the business.

Q. What sort of pay do they get?—*A.* The average pay is Rs. 20 to Rs. 30. They get bonuses as well for good outturns.

Q. That is practically all that is required?—*A.* Yes. For structural alterations you want a tile expert. If you want to increase your carrying capacity or anything of the kind you would want a mechanical expert.

Q. Where would you get one?—*A.* Difficult to get.

Q. You refer to the fact that the industry is somewhat being overdone?—*A.* On account of labour.

Q. Would better pay produce more labour?—*A.* I do not think it would. People are only coming from the surrounding villages. We get all the available labour from four or five villages and beyond that they would not come. Higher up in the country they would be attracted by the rubber estates and there they get higher pay. We might get some by a higher wage, but it is not advisable to raise it.

Q. You say the clay fields on the West Coast are showing signs of exhaustion. Have people made any investigation elsewhere?—*A.* There are other fields higher up the river, but it means difficulty of transport. There are other rivers which might be exploited.

Q. You mention the industry of dessicated coconut manufacture. Do you know if it has been tried here?—*A.* I do not think it has been tried. It is very successful in Ceylon. Dessicated coconut is simply coconut shredded and dried and boiled with sugar or molasses and dried in a drier, and it is shipped home to confectioners for confectionery purposes. There is a big trade in Ceylon.

Q. With regard to the silting up of the Beypore river, did you put the matter before the Local Government?—*A.* I have not. There is some talk of its being brought to their notice. Something has to be done, probably by the railway. They are bringing their line up to Beypore, and they have to get their coal over the bar and will probably act in the matter.

Mr. C. E. Low.—*Q.* Have you had any experience of those young men who come out from the Institute of Science at Bangalore?—*A.* I have not been connected with any.

Q. Have you any idea of what the probabilities are as regards hydro-electric schemes on the western slope?—*A.* There are waterfalls on the Coorg border and there are several places in Mysore. They have already been taken up by the Mysore Government.

Q. Is there any steepish fall along the western coast?—*A.* There is a good fall above Balipatam and there are 10,000 tons a year of wood suitable for paper fibre available as I have been informed by the Forest Department.

Q. Have you been connected in any way with the Wolfram business in Tavoy?—*A.* I was a member of the Leibaoak Syndicate. We sold all our Wolfram to the Burma Rice and Trading Company, before the war, and it was all shipped to Germany.

Q. Did you get any analysis done in Burma?—*A.* Yes, also in Bangalore and also by the Government at Hamburg.

Q. By any Indian assaying authority?—*A.* We accepted the Government analysis in Hamburg.

Q. Nobody accepted the analysis here as in any way authoritative? The buyer did not?—*A*. The buyer took the Hamburg analysis, that is, the German Government analysis.

Q. And you sold on a contract the basis of which was the German Government analysis?—*A*. Yes.

Q. You say that the German buyers in this country were ready with their finance. Have you seen anything of the work of Messrs. Schroder Schmidt in connection with manganese?—*A*. I have had some connection with them in Mysore. They actively financed a number of concerns in Mysore.

Q. They gave advances?—*A*. They advanced so much a ton. They gave us Rs. 1,000 a ton at the mine for our Wolfram and paid balance after it had got home.

Q. And that enabled you to work the mine?—*A*. Yes, without any special finance. We lost the block because it was taken away from us by the Government of Burma.

Q. You told me about analysis in this country. Would it be very difficult to get purchasers to agree to a contract based on Indian analysis if it were a Government analysis?—*A*. Yes.

Q. The difficulty comes in as regards samples?—*A*. Yes. Sample at the port of discharge.

Q. The Indian analysis sample would be at the port of shipment?—*A*. Yes.

Q. There have been great complaints about adulteration in the Indian produce which thereby has lost its market, and it was suggested to us in Madras that, if you have a system of optional certificates given by Government, the men who ship on analysis would get an all round higher quotation. But supposing there were a failure in sampling, there might be still deliberate fraudulent adulteration?—*A*. Sampling is the difficulty.

Q. Do you think, as a matter of fact, that it is practicable to devise some system of sampling in this country which will overcome deliberate fraudulent adulteration?—*A*. It would be easier to overcome the difficulty, if there is a proper system of sampling. Take cotton. You may find one bale all right, but you may find cotton mixed in other bales.

Q. I was hardly touching the question of bales. You get a series of complications in it. You do not say how that would be overcome at present?—*A*. They would have to appoint surveyors and make an exhaustive examination of the shipment, or whatever is complained of.

Q. Would that be possible for ordinary current shipments?—*A*. If they do their sampling systematically. If samples were taken in a systematic manner it would be all right.

Q. That would be all right against ordinary shipments, but would it stand against deliberate attempts at fraudulent adulteration?—*A*. If you have got a properly drawn sample from bulk it would be all right.

Q. If you can get bulk sample you think it would be all right?—*A*. Yes.

Sir D. J. Tata.—*Q*. Besides Henke's and the Mission factories, are there a number of small Indian factories all round this coast?—*A*. About 36 in Mangalore and other places close by there are seven Mission factories, also a number of small factories in the Cochin district.

Q. What class of goods do they make?—*A*. Mostly terracotta tiles, and some fire-bricks and fire clay bricks. We make pipes.

Q. What is needed to make this work more common all over the place, to make more factories spring up, and to make the thing a paying industry? Capital alone?—*A*. I do not think there is need for any more capital.

Q. The industry is worked as far as it can be worked?—*A*. If, as I have said in my notes on tile works, you confine it to one particular place where the distance from existing tile works is great, and you have got a limited market, it is worth while putting up a small works. There is sufficient supply to meet the demand at present.

Q. In the first page of your written evidence you say, "The Indian Institute of Science, I believe, demonstrates the use of new and up to date plants on a small scale and these should be demonstrated by experts and instruction given both in English and the Vernacular". What sort of plants do you refer to?—*A*. At one time, under Professor Rudolf they had the idea of bringing out specialists for short terms and working kilns, distilling apparatus, etc., on a small scale; demonstrating their use in a practical manner.

Q. What sort of industry do you refer to?—*A*. Professor Rudolf told me that they could demonstrate tile making and several other industries. He was at the time investigating distilling.

Q. Who was to give instruction in the vernacular?—*A*. They would have to get men to translate for the expert who would presumably not know it.

Q. What sort of clays do you refer to when you say, "I have been informed that there are clays in Cochin which would be worth shipping home as ballast in normal times"? For what purposes?—*A.* For the superior sort of pottery kaolins.

Hon'ble Sir R. N. Mookerjee.—*Q.* In the second paragraph of your note you say, "Government control could be exercised in preventing companies going to allotment on insufficient capital." No company can go to allotment without full capital being subscribed but the Government do not express any opinion as to whether that capital is sufficient or not sufficient. You do not want additional control?—*A.* No.

Q. You also suggest Government control of machinery and all that. Do you want Government control in cases where Government give assistance, or do you want it generally?—*A.* It is in the case of new industries to which the public would not subscribe. If they had a favourable Government report on the particular industry, they would be more ready to subscribe.

Q. Even if the Government do not give any financial help? Do you think that Government experts are better than commercial experts?—*A.* I think the company, if it was convinced that it was a sound concern, would be willing to pay for the Government experts as to its being a sound proposition or not.

Q. In your opinion, the Government expert is a better business man than any of these business men who have been floating so many big companies? Messrs. Tata never went to Government to find whether their concern would be a successful one or not?—*A.* No. But for smaller industries?

Q. Don't you think that that would interfere too much with private enterprise?—*A.* It would be optional to the company.

Q. I thought you said that it must be done?—*A.* If they gave Government assistance.

Q. But where there is no Government assistance?—*A.* It would be optional to the company to ask for it as an additional inducement to get capital subscribed.

Mr. A. Chatterton.—*Q.* You speak of the difficulty of getting efficient labour for these tile factories. Would that be overcome if you provided housing accommodation for them in the neighbourhood of the works?—*A.* That has been done, but it would not remove the difficulty entirely. Only the bachelor employees who have no families will go and stop there.

Q. But there are a large number of coolies who migrate from this district to the planting districts and elsewhere. Could you not provide accommodation for both married people as well as bachelors?—*A.* We intend doing that.

Q. The tile industry is carried on by a large number of Indians and by the Basel Mission people and by your own company?—*A.* Yes.

Q. At the present time, there is no technical control over the industry at all?—*A.* None, except the Inspector of Factories.

Q. I do not mean in reference to inspection but in reference to internal management?—*A.* No. If a new company is started they will get up to date processes as much as possible, and they will improve their output and improve their product.

Q. You mention that there are a large number of these factories. Are there new factories now being started?—*A.* One factory has lately been started on the Beypore river.

Q. Is there any use made here of the Ceramic Expert in the Bombay School of Arts?—*A.* I did not know of his existence.

Q. For the industry located on this side of the country do you think there will be any advantage in having a special Government School or laboratory here for training pottery experts?—*A.* I do not think so. I do not think there is room for a school for experts in the industry.

Q. Is it capable of any further development?—*A.* No. There is not enough demand for fireclay goods or anything of the like to make worth while its establishment.

Q. You think of the possibility of sending kaolin from Cochin to Europe?—*A.* Yes, at minimum rates of freight.

Q. Would it not be possible to start the manufacture of China ware here?—*A.* It might. But there is too much iron in it. It is too impure. I mean the Beypore kaolins.

Q. What is the good of exporting it from Cochin if it is too impure?—*A.* Cochin kaolin is much better.

Q. Could you not bring it by sea from Cochin?—*A.* There are China clays in Cochin and also on the ghâts above Marmagoa which would repay investigation for Chinaware manufacture.

Q. You think there is some possibility of development if you can get scientific expert assistance in the matter?—*A.* Yes.

Q. You might make a beginning by sending samples of these materials to Bombay?—*A.* I am much obliged to you for the information.

Q. Here, it was practically a German industry?—*A.* It was begun by Swiss missionaries. The Henke's Works were German, and most of the machinery both in the Henke's and also in the Swiss Tiles Works is German.

Q. And is all the capital at Feroke German?—*A.* Yes. Only a few subscribers in Bremen and Hamburg—about three lakhs of rupees.

Q. Your works now has been sold to a British company?—*A.* Yes. We have not changed the name.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Have you been to Mangalore?—*A.* I do not know Mangalore.

Q. Are the factories at Mangalore which you refer to big factories?—*A.* Two big factories as well as many small ones. One factory which is opposed to the Basel Mission is Messrs. Morgan & Sons, and they have one large kiln.

Q. You say that you have labour trouble. What is the average rate of wages?—*A.* Four to five annas.

Q. Do you think that with an increase thereof your troubles will be over?—*A.* I do not think you will get men if you pay more.

Q. Do people from these parts migrate to other places?—*A.* They do not migrate from the actual coast. They migrate a little further up.

Q. Can you bring them from there and employ them?—*A.* We could do so, but it will tend to raise the rates.

WITNESS NO. 247.

MR. J. SADASIVA AYYAR, *District Forest Officer, Mangalore North, South Kanara.*

WRITTEN EVIDENCE.

Catechu industry.

The catechu industry is confined only to a portion of the Coondapur taluk of the South Canara district extending from the coast to about 10 miles in the interior towards the ghats for the reason that catechu growth is confined only to that portion. It is said that in North Canara attached to the Bombay Presidency catechu trees grow and catechu is made but I have had so far no occasion to acquire knowledge of the area, of its growth and its manufacture in that Presidency. The following notes are based on my own experience extending to about two years gained in the Coondapur taluk in 1911 and 1912, when I was a Range Officer there in charge of the reserved forests.

The catechu is found in patches in about 200 square miles forming the north-western portion of the Coondapur taluk. Allowing for cultivated lands which are confined to numerous small valleys found in the area, the actual catechu area may be roughly estimated at 15 square miles comprising reserved forests, unreserved lands and private lands. Reserved forests comprising an area of about 3½ square miles are not worked for catechu by the Forest Department, which at present confines its operation only to unreserved lands and manufactures annually about 15 tons catechu. The private owners manufacture about the same quantity every year. The hill tribe locally called Kudubies have special knowledge of the manufacture of catechu and are chiefly employed for the purpose both by the department and private owners. The manufacture is confined only to the winter season—December to March. The chief market is Mysore, where it is said it is largely used with betel leaves for chewing purposes as tobacco is used with them in the South Canara and Malabar districts.

Financial aid to catechu industry.

The Forest Department itself is in charge of the industry as far as Government trees are concerned. About 15 tons of catechu worth about Rs. 12,000 are made every year. No private individual is available to purchase the trees from the Government and manufacture catechu himself because he has not the necessary capital. People are busy with paddy cultivation and paddy trade and are not generally keen on this industry As regards trees on private lands, private owners do not receive any financial aid from Government. Neither is there any bank in the area to finance them. As far as private owners are concerned, the industry is at the hands of a few petty traders who purchase trees on private lands for a lump sum and manufacture catechu themselves. Often times, the petty traders have no capital of their own for the industry and borrow money from money-lenders at a high rate of interest. The high rate of interest is not paying and is sometimes ruinous. The petty trader, being poor, has nothing to fall back upon and is unable to meet even temporary loss. He gives up the business and the industry does not develop. Other petty traders take up the industry only to come to the same end. The industry is thus financed by a few money-lenders, who have no direct interest in the industry but whose concern is to get the highest money return on the loan they have given. This situation of the industry is not encouraging. The remedy consists in the Government undertaking to give loans at the Government rate of interest. The establishment of a bank for the purpose in a place such as Coondapur, where there is not enough trade, is out of question. Other forms of Government aid such as money grants-in-aid, subsidies, etc., do not commend themselves to me for the reason that the industry is confined to a particular area and much capital is not required. Loans by Government at a low rate of interest is the only form of Government aid, which I consider is applicable to this industry. I have no experience of co-operative societies. I do not advocate here that the Government loan should be made irrespective of all local conditions and circumstances. It must be in force only till capital is available locally at Government rate of interest from private people, when the grant of Government loans might be withdrawn. When that time will come it is not possible to say. However I am certain that it will not come for many years to come. Many people have money in the Post Office Savings Bank and in Government Promissory Notes for a low rate of interest but have no mind to give loans for the benefit of local industries because there is, I believe, no mutual confidence. The business habits of the people at large and the standard of honesty should develop to create trust and confidence in the moneyed people who generally view petty traders with suspicion. Petty traders however have a special fear for Government loans and repay them willingly. Government loans thus help to educate the middleman to behave honestly in his dealings, apart from the fact that a particular industry is also encouraged at the same time. Large advances were made in the Coondapur range by the Forest Department in 1911 and 1912 for workmen and contractors for fuel operations who returned them by work done without giving any trouble.

Technical aid.

The catechu industry has not so far received any technical and scientific aid from Government. The manufacture of catechu is being done in the old established way year after year. The Forest Department is following local custom in the manufacture as well as private owners. Developments are possible in many directions—in the best method of growing and tending the tree, the best age and season for felling trees, the best and cheapest method of manufacture, etc. The scientific and technical department of the Imperial Institute is not within my knowledge. However I believe that the Institute will not be able to afford any practical technical aid to such a limited industry as catechu. My own idea is that there must be provision for research for industry, including catechu, in each Province. The Advisory Council for Research in the United Kingdom cannot give practical technical assistance to Indian industries. India is a big country consisting of many provinces with varying local conditions. What is best suited to one province may not and does not generally suit another distant province. I consider that the industries of each province should be investigated and developed within the province itself under the control of a separate Research Institute. It may apply for and take advice from the Imperial Research Institute whenever necessary. The catechu area here is limited and does not require any further industrial survey.

Assistance in marketing.

Assistance in marketing catechu is very badly wanted. About 30 tons of catechu worth about Rs. 25,000 is made here both by Government and private agencies and the whole quantity is invariably purchased by two or three capitalists of the Mysore State, who have formed themselves into a sort of a company to control the market, and carted to Hassan in Mysore State, which is said to be the centre of the market. Excepting Mysore, no other big market capable of consuming 30 tons of the produce annually is known. Enquiries were made at Bombay but not with any degree of success. Sellers and buyers are thus at a great distance apart and industrial exhibitions of catechu and other products organised by Government are desirable to bring them in contact. It is not enough that exhibitions should be merely popular in character. Their chief aim should be to educate not only the seller as to the markets where produce can be sold but also the buyer as to where and how the produce is available for him. Further, trade representatives for the whole of India may be appointed in Great Britain and the Colonies and supply both the buyer and seller with the necessary information and assistance in the matter of marketing. The other forms of Government assistance mentioned in the list of questions also commend themselves to me. In fact, I consider that anything done in this direction would not be superfluous as the success of catechu industry and its development depends on the successful marketing of the produce.

Other forms of Government aid.

Regeneration and growth of catechu is very much hampered by grazing. Cattle are fond of tender shoots of catechu and browse them without leaving much chance to put forth fresh growth. This serious inpediment to growth goes on year after year in all the worked areas of unreserved lands, which are open to free and unlimited grazing without any restrictions. A larger amount of damage is done by cattle by treading on and crushing and otherwise damaging young seedlings. It is not necessary to write much on the subject as the damage done by cattle and cattle grazing to catechu growth is commonly known. The remedy to avoid the damage is not however apparent. Rules permit free and unrestricted grazing in unreserved lands and so long as catechu areas continue to be unreserved lands, stopping grazing in the area would be illegal. Most probably constituting the areas as "reserved forests" and stopping grazing in them is the only practicable remedy. Such a procedure would no doubt interfere with the free user of the areas by the adjoining ryots who want plough and milch cattle for agricultural and domestic purposes. However these local people enjoy the privileges at the expense of the people at large and at the expense of an important industry and they have in my opinion no right to do so. If the benefits of keeping cattle outside catechu trees be shown to the people by making a beginning in Government lands, private catechu owners also would begin to appreciate them and adopt a similar procedure in their lands in course of time. Secondly, catechu areas should not be handed over on darkhast on permanent patta. Private owners care only for immediate gain and sell away even immature trees for boiling. Exploitation of immature trees means waste of capital. Further the market gets unnecessarily glutted for a period, which is not good for the development of the industry. Of course this state of affairs cannot go on for years and there will come a time when a serious deficit of catechu yielding mature trees will have to be faced. Thirdly, acquisition by Government of catechu areas already assigned on permanent patta should be made possible if the pattadar wastes the catechu growth on his land by selling immature trees or by allowing it to be hacked for his own domestic purpose. Such a procedure is not likely to cause hardship on the pattadars. It may be granted that many of them would be alive to their own interest and sensible enough to avoid waste. Even though the power of acquisition be sanctioned, I expect that it will be applied in actual application only in a few cases. A precautionary measure of the kind itself would improve matters and prevent waste to a very large extent.

Training of labour and supervision.

Nothing has so far been done to improve the efficiency and skill of the labourers who are employed in the catechu industry. The labourers belong to a hill tribe locally called "Kudubies." Before the reservation of the ghaut slopes in the district, they were doing temporary cultivations locally called "Kumeri" on the hill slopes. After reservation, this shifting cultivation was curtailed and this forced many of them to take to paddy cultivations under local landlords. A few of them left the district and went to the adjoining Mysore State. Owing to ignorance and lethargy, they are generally in a state of indebtedness to landlords. Some of them who happen to live near the locality where the Forest Department permits kumeri cultivation take to kumeri cultivation but their number is few. In return for kumeri cultivation, the kumeridars are bound to supply labour on payment whenever wanted by the department and the works on which they are employed are creeper cutting, fire protection works and catechu manufacture, the last being the most important. Besides the Kudubies who cultivate kumeries under Forest Department, other Kudubies also work at boiling catechu but it is very difficult to attract them to work. They are as a class without ambition and extremely lethargic and ignorant. They do not want money but generally yield to pressure. They are good at the art of boiling catechu. Other classes of labourers are ignorant of the art. Neither are they anxious to learn. If any be anxious, there are no industrial schools in the locality to teach the art. Kudubies have no education of whatever kind and are not anxious to impart their knowledge of the art to others. Neither do they hesitate to steal catechu balls during the time of manufacture. Free and compulsory primary education will improve them but that is not enough. The only way of attracting them to labour is by permitting shifting cultivation on a greater scale. This is against the interest of reserved forests and cannot be permitted. Kudubi labour is thus becoming scarce year after year and the deficiency will be supplied if only other classes of people are taught the art. An industrial school at Coondapur, the headquarters of the taluk, in which special attention should be paid to the catechu manufacture appears to be a remedy. I have no experience of the several systems indicated in the list regarding the training of labour and supervision.

Other forms of Government action and organisation.

The division is very backward with regard to railways and water transport. The headquarters of the district is Mangalore up to which town only the railway runs. The other portions of the district have no railway communications at all. Coondapur is 60 miles north of Mangalore connected only by road. There is no railway communication from Coondapur to Hassan and other important centres in the Mysore State. There are also very many rivers and waterways in the district which are at present passable for country boats only for a small distance from the coast. If they could be improved further up their course by blasting rocks or by other forms of improvement considerable advance in the development of the local rice industry could be made. Forest produce such as fuel and timber also could be placed in the market at cheaper rates. The improvement would not however help catechu industry to any appreciable extent. The Forest Department realised the importance of improving water transport long ago and undertook improvements here and there. But the improvements are a matter of public utility and do not concern alone the Forest Department of which the funds are not unlimited. Extension of railways will greatly help such new industries as the paper and match industries. The forests of the division contain any quantity of softwoods, which it is impossible to exploit for any kind of industry in a profitable way on account of the difficulty and expense of transport. Further enormous theft goes on under transit by water. This does not affect the local catechu industry but other kinds of industry are greatly affected. The chief produce I have in my mind is fuel. Contractors ship fuel to Mangalore by local country boats from Coondapur (Gangolly bar) and the transport takes 4 or more days according to the varying conditions of the weather and season. During this period at least 15 per cent of the produce is stolen by the crew of the boats.

The theft mostly consumes the profit of the middlemen and indirectly affects forest operations a good deal. Even railway transport is not free from this evil. I had some experience of this in the Madura district where in 1907 to 1910 as a Range Officer of one of the ranges I had to consign firewood by rail to Madura town. Firewood was consigned in open trucks and facilities for theft were therefore many. I believe similar thefts continue to go on now as well. Supply of closed trucks is a safe guard against theft. But the railway company is unable to meet the demand for closed trucks. Their stock is so very limited. No remedy suggests itself to me to stop theft in water transit. Most probably special legislation and heavy penalties would mitigate the evil if not entirely stop it.

The present policy of the Forest Department as far as I am aware is to place at the hands of private enterprise such industries as have established themselves well. New industries require capital, experience and organisation, which cannot be supplied by private enterprise from the beginning. The Forest Department starts such industries at the beginning undergoes the initial difficulties, trains and organises the labour and educates the people as to how to do the work. When a new industry is well established and private people come forward to undertake and continue the work, the industry is transferred to them. Thus the Department was in charge of fuel operations in the Coondapur Range for many years. For the last few years, private contractors have been available to do the work and the whole operations have been transferred to them. Catechu manufacture is however still at the hands of the Department. No good contractor is available to undertake the industry which requires much capital. Moneyed people are available in the locality but they work only in a particular groove and stick to it tenaciously. The spirit of new enterprise is wanting in them. Till this spirit takes firm hold of them, the Forest Department should continue to start new industries and be in charge of them to hand them over eventually to private enterprise. Many misunderstand the Forest Department in this direction of its activity but I consider that the misunderstanding is based on imperfect knowledge of local conditions.

Another form of Government action to develop the industry is to help regeneration of catechu by direct sowing. Planting is out of question, being expensive but broad cast sowing costs very little. The seeds germinate easily and any quantity of seed is procurable locally. However the success of regeneration depends upon the subsequent protection that can be given against external dangers such as browsing by cattle. I would include in this operation catechu areas of both lands—reserved forests and unreserved forests. The Forest Department has under its control many thousands of acres of evergreen forests in the ghat slopes. They have no commercial value at present. They are further inaccessible and confined to the interior of the District. However the Forest Department is trying to improve the growth in the area by appointment of special establishment and by undertaking such operations as creeper cutting, fire protection, improvement fellings, etc. However many thousands of acres of catechu areas in the unreserved lands are out of its attention and protection. They have great commercial value and yet are not reserved forest and are not brought under the protection of the Forest Act. I consider that the constitution of the area as reserved forest and the starting of cultural operations in them to assist natural regeneration will go a great way to help the development of catechu industry.

General.

South Canara is a land of soft woods and bamboos. The rainfall is heavy, being as much as 200 inches annually, and is conducive to the regeneration and improvement of any number of soft woods. In fact only about half a dozen species among many hundreds of species available in the forests have any demand as timber. Even for firewood, only a few species are useful. All the soft wood species which have no sale of any kind are girdled and killed in the few fuel and timber areas at present under working of the Forest Department. I believe that these softwoods species, at least most of them, can be used for wood pulp. The match industry also appears to be well adapted to the locality as some of the soft woods can be used for it. The matter however requires special investigation by experts. However there is one thing which is certain. Water transport is very backward in this district and so long as it is so, transport of raw material to a factory, which must necessarily be located in a commercial centre on the coast, must be very expensive and may be prohibitive. The position is this. The raw material is confined to the ghat portion which is the eastern portion of the district. Important towns with plenty of labour and other facilities are on the coast 10 to 40 miles distant. The existing roads are steep and put considerable strain on draught animals. They cannot be but otherwise in a hilly country like South Canara cut by many shallow valleys. Railways are entirely absent. If railways be opened and water transport improved, I am sure that the vast quantity of raw material now shut up in the corner of the district can be brought within workable distance for any industry which might be found suitable by expert investigation. Any amount of labour is available locally. The majority of the people are only tenants the fruits of whose labour mostly go to the landlords. They have hardly sufficient to maintain themselves. They remain in the district only about three months in the year, June, July and August which is the busy cultivating season and spend the rest of the year in the coffee and *arecanut gardens of the Mysore State. I understand that more people go up the Mysore ghats from coast villages than from the interior of the district. These people could be engaged in any new factory that might be opened. No labour difficulty would be felt.*

ORAL EVIDENCE, 2ND FEBRUARY 1917.

Sir F. H. Stewart.—*Q.* You give us a good deal of information regarding the catechu industry. Would you tell us for our information exactly what that industry is, how catechu is grown, etc.?—*A.* We do not make any artificial attempt to grow it. It grows spontaneously in different places. The growth is confined to one taluk. It does not grow over the whole area of South Kanara.

Q. Is it a valuable industry and one capable of considerable development?—*A.* It is and is likely to become more valuable in future. It is not found throughout the whole district. Neither is it found all over the taluk. The growth is confined to portions of a particular taluk. I do not think it is capable of growing in other places. It is just like teak which is confined to Malabar. It does not find favourable conditions for growth in the southern districts.

Q. There is plenty of it in Burma?—*A.* I understand it is so. But it is not the case here. In North Kanara it is said to be available but so far as South Kanara is concerned it is only confined to one corner. It is chipped in small pieces and then boiled with water. The decoction is taken and then it is allowed to evaporate. Then it becomes catechu. It is not a nut.

Q. The chief market is Mysore?—*A.* The chief market is Mysore and our difficulty at present is that we do not know much about the market for it besides Mysore.

Sir D. J. Tata.—What is it used for?—*A.* It is used for *pan* (betel) just as tobacco is used with betel leaves.

Mr. A. Chatterton.—*Q.* It is used for dyeing in Bangalore? It used to be an article of considerable export?—*A.* I don't know.

Sir F. H. Stewart.—*Q.* You say that large advances were made in the Coondupur range by the Forest Department in 1911 and 1912 for workmen and contractors for fuel operations who returned them by work done without giving any trouble? Why were these advances made?—*A.* To attract labour.

Q. These advances were made to attract labour from Mysore?—*A.* People from South Kanara go to Mysore for work in coffee and arecanut plantations. In order to prevent them from going away we gave them these advances. Otherwise they might go away and we would have had great difficulty in securing labour.

Q. When you give them these advances they stay and do the work?—*A.* They do.

Q. Besides this catechu manufacture you say that they are also engaged in cutting creepers, etc.?—*A.* Yes. That is with regard to the Kudubies who are engaged in this industry in South Kanara. The Department can safely advance the money. There is no likelihood of its being misappropriated or anything like that.

Q. Towards the close of your note you say that the Forest Department has under its control many thousands of acres of evergreen forests in the ghât slopes and that they have no commercial value at present. Do you think that there is a great opportunity for development on the commercial side?—*A.* I do.

Q. And what about water transport?—*A.* That is capable of very great improvement.

Q. How are questions of water transport dealt with now? Does the Forest Department do anything?—*A.* We do very little with regard to the improvement of water transport. The difficulty is that we are not sure of the markets at all. It would be advantageous not only to the Forest Department but also to every other department and the public as well. The question of providing the transport would be for the present a question more for the Public Works Department than for the Forest Department.

Q. The Forest Department must know pretty well what is required. Do they make any suggestions to the Public Works Department or anything of the sort?—*A.* They are better capable of understanding the technical side of the thing than the Forest Department. The technical side is more important.

Mr. C. E. Low.—*Q.* Have the Forest Research Institute done any experimental work in connection with catechu?—*A.* I have not seen anything.

Q. Do you think that it is a matter which should be taken up by the Research Institute?—*A.* Yes.

Q. How would that be done?—*A.* I might write to the Conservator and the Conservator could ask them.

Q. Have you suggested this to the Conservator?—*A.* No. I have not.

Q. You say that catechu areas should not be handed over to private persons on permanent patta? What is that permanent patta? Is that a forest area that you are referring to?—*A*. It is unreserved land. There are certain areas called "Kumiki" peculiar to South Kanara. The pattadars exercise control over them for their own cultivation purposes.

Q. When they get it out for cultivation, do they do what they like with the forest growth?—*A*. Yes.

Q. Is not catechu always grown on poor land?—*A*. Yes.

Q. On open and poor land where chiefly thorny shrubs grow?—*A*. Yes. That is the case.

Sir F. H. Stewart.—*Q*. How long does it take to grow?—*A*. About 40 years.

Hon'ble Sir R. N. Mookerjee.—*Q*. Do not the young trees give also catechu?—*A*. Yes. But they do not give in such great proportion as the older trees

Mr. C. E. Low.—*Q*. When you cut it off, do you get shoots?—*A*. Yes.

Q. Have you made any study of the methods of boiling catechu and its uses?—*A*. I have not myself studied the thing. We are only following the old method.

Q. You have not studied the method?—*A*. It is a very complicated and intricate operation. Only the hill tribes who are called Kudubies know it. They only have the expert knowledge necessary. Other local labourers do not attempt to do the stuff.

Q. None of the Forest Officers here has made any experiment in regard to the boiling of this catechu?—*A*. None so far as I know.

Sir D. J. Tata.—*Q*. You say that the catechu tree has a life of forty years?—*A*. It can grow for even a longer period.

Q. You mean that the exploitable age is forty. At what age would you begin to operate?—*A*. That is the time that it pays to operate.

Q. Then do you mean to say that the tree must be at least forty years old before you can get anything?—*A*. Financially the best age for exploiting it is 40.

Q. You refer to young plants being destroyed. Can the people get catechu from them?—*A*. They cut it only for firewood.

Q. It is surely blind policy to cut it for firewood?—*A*. These ignorant people only care for their immediate wants. They do not look ahead and do not care to wait for forty years. Further they are in a hurry to extract what they can even out of immature trees.

Q. What is the demand for catechu altogether? You say that assistance in marketing catechu is badly wanted and that 30 tons of catechu worth about Rs. 25,000 is made locally both by Government and private agencies, and that the whole quantity is invariably purchased by two or three capitalists of the Mysore Province. Is there any demand outside the Mysore Province? What is the total demand for the whole of India?—*A*. That I do not know.

Q. It does not go outside India?—*A*. That is exactly what I want to know.

Q. Can you not form any idea as to the total value of the trade?—*A*. The trade amounts here to Rs. 25,000. That is so far as my division is concerned. I do not know about the total value in India.

Q. You suggest that popular exhibitions should be held and that trade representatives for the whole of India may be appointed in Great Britain and the Colonies to supply both the buyer and the seller with necessary information. Do you think that the trade is worth it?—*A*. We spend about Rs. 3,000 and we get in return, Rupees 12,000. And I suppose that in other provinces also the margin of profit must be very great. Therefore I think the expenditure can be met. But I say this not with reference to catechu only. I speak of all trades in India including the catechu industry.

Q. I thought you wanted this specially for the catechu industry?—*A*. I think that catechu is not so great an industry by itself.

Mr. A. Chatterton.—*Q*. How long have you been a District Forest Officer?—*A*. For the last nine months.

Q. And before that?—*A*. I was on special duty in the Nilgiris.

Q. Besides this catechu industry in the South Kanara district I understand that there is a good deal of sandalwood distillation going on?—*A*. Yes.

Q. How many native distilleries are there?—*A*. About 40.

Q. 40 separate distilleries?—*A*. Yes.

Q. Do you sell any sandalwood from the South Kanara forests? Is there any sandalwood in the South Kanara forests?—*A*. There is but not on a very large scale.

Q. Does the Forest Department sell any wood?—*A*. No.

Q. Where do they get the wood from?—*A*. From Mysore and Coorg. People attend auction sales and transport wood on cart loads to South Kanara.

Q. Is there a large sale of firewood to these people?—*A*. Not so far as the Forest Department is concerned. We have got some rules about the method of felling and naturally they do not like them. Most of the stills are located in private lands.

Q. Is there a considerable area of private forest in [illegible]?—*A.* Yes.

Q. Turning to this catechu industry how do they break up the wood?—*A.* They chip it with axe.

Q. Into what size pieces?—*A.* Small pieces half an inch square.

Q. These chips are then subjected to prolonged boiling?—*A.* It is boiled for a day. *They boil it six or seven times. The decoction is then taken and next day the chips are thrown out.*

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* How does Government sell their stock *of catechu? In what way?*—*A.* They call for tenders.

Q. Are the tenders sent to all the traders?—*A. The notices are chiefly locally distributed. In Mysore there are some customers. They are sent to the people who have purchased catechu before and other known contractors.*

Q. Are these people asked to attend?—*A.* The notices are widely distributed locally.

Q. Are there no local people who come in? Is it all Mysore people that attend?—*A.* We only distribute tender notices. None attends personally.

Q. At what time of the season do the sales take place?—*A.* Just now I have sent the notices for publication in the District Gazette. This is the time for the sales.

Q. When will you sell it?—*A.* About the beginning of March.

Q. You call for tenders?—*A.* Yes.

Q. Is any quantity mentioned?—*A.* Yes.

Q. You manufacture the catechu yourself?—*A.* Yes. That is all done under departmental operations.

Q. Is it not sold by auction?—*A.* Under the recent orders, it must be sold by auction. From this year forward we will sell it by auction.

Q. About what time?—*A.* I think it is the 15th March. I do not exactly remember.

Q. Are you going to have it auctioned?—*A.* Yes.

Q. What is generally the quantity?—*A.* Between 15 and 16 tons. Our aim is to manufacture 15 tons.

WITNESS NO. 248.

MR. V. GOVINDAN, B.A., F.Z.S., *Assistant Director of Government Fisheries, Madras.*

WRITTEN EVIDENCE.

Q. 5.—Money grants-in-aid may be given to parties who have exhausted their private resources in trying to develop some industry by introducing new methods or improved tools and appliances provided that the experiments so far have been in the right direction and that for want of further funds they are likely to fail. Loans granted to industrial undertakings should always be with interest but the rate of interest should be as low as possible and repayments of such loans should be by easy instalments. Machinery and plant may be given on loan in the first instance and when the undertaking proves a success they should be given to the party on the hire purchase system. Guaranteed Government purchase of products will encourage industrial enterprise very considerably.

Q. 6.—In all methods of Government aid there should be some sort of Government control—the least form in which it should be exercised is by audit so that Government may satisfy themselves that money or other aid is not being wasted or diverted to other objects. Such audits should specially scrutinise the price of raw material, labour, etc.

Q. 7 *and* 8.—The experience gained with regard to the pioneer factories started by Government for the manufacture of fish-oil and guano has been very favourable and leads one to think that such of the new industries as are not likely to be undertaken by private enterprise will have to be pioneered by Government. Such pioneer factories will have to be continued for some time till the particular industry is well established. Moreover such factories will have to train a sufficient number of workmen skilled in that industry as it is not likely that private factories would undertake it.

Q. 9.—The fishing industry is to some extent hampered by the existing financing agencies. The fishermen in certain localities borrow money from Sowcars who, though they do not charge any interest, demand a share of the sale-proceeds of fish caught every day, e.g., on every Rs. 200 lent the Sowcar gets a share equal to that of an able bodied labourer who works in the boat, and the wages earned by such fishermen labourer on the West Coast have been estimated to be about Rs. 120 per annum in a normal fishing year, and hence the loan of Rs. 200 earns as much by way of interest. In certain other localities a loan of a few hundreds entitles the lender to buy the catches of fish landed by the fishermen at the market rate less 10 to 25 per cent discount. Such loans are usually raised for buying or renewing boats and nets, and though they decay in a few years, the depreciation has to be borne by the borrower and the debt stands as it was.

Co-operative societies.

Q. 11.—The Fisheries Department has been trying to assist the fish-curing industry by co-operative organisation and a scheme has been drawn up.* Moreover with a view to inculcate thrifty habits among fisher folk co-operative credit societies are being organized among them. The interesting feature about them is that the members are compelled to make monthly contribution for a fixed period and thereby build up the working capital of the society.

Q. 12.—Co-operation should be encouraged in the case of most of the cottage industries which do not require costly machinery and mechanical power, e.g., hand-loom weaving, metal ware, coir and net making, fish-curing, etc. The object is to organise the buying of raw materials and selling of the manufactured goods to the best advantage in order that the middleman may be kept out. Such societies may also be able to provide improved tools and appliances for the use of their members.

Limits of Government assistance.

Q. 14.—Government aid should not be withheld if the new enterprise will benefit the public, e.g., in the case of raw products there is an established trade, but if it is beneficial to treat such products in the country it is very desirable that Government aid should be given to such undertakings with the object of encouraging local manufactures.

Technical aid.

Q. 15 *and* 16.—In the fish-oil and guano manufacture technical aid provided by the Government demonstration factory has been of immense good. In the short space of a few years nearly 250 small factories have been started on the West Coast especially by persons of limited means who would not have ventured to invest their money in iron vessels and other appliances had it not been for the fact that the demonstrations convinced them of the simplicity of the process and the large profits to be made in oil and guano work. Several lakhs worth of material is now being exported in a normal year, and had it not been for the initiative taken by Government all these benefits would not have been derived. When successful experiments relating to any industry have been carried out in a central technological institute or laboratory it is desirable to demonstrate the commercial possibilities of the same in demonstration factories worked on a commercial scale.

Research abro

Q. 21.—The Imperial Institute has rendered some service to the fisheries as regards scientific information but as an advertising medium it has not been so successful. Business people in London did not resort to it so freely as one would have thought. This seems to be due among other causes to its location away from the business part of the city. Matters could be improved to some extent if well-informed Indian officers are put in charge of the Indian galleries; this would enable visitors to get almost first hand information relating to various exhibits.

Q. 22.—For many years to come arrangements made in India for research work cannot be complete and it would be advantageous to carry on such work in Europe also.

Surveys for industrial purposes

Q. 25 *to* 27.—There should be a well-equipped central institute with a thoroughly qualified expert staff which will serve as an advisory body to the whole of India. Further surveys of the resources of the country should be conducted by the staff of the various departments and the result should be compiled and published by this central institute.

Commercial museums.

Q. 29.—Commercial museums should be established in all big cities. Their use will be much increased if the locally manufactured goods are exhibited side by side with those imported; whenever possible models of plant required in their manufacture and the stages of manufacture from crude raw material to the finished product should also be exhibited. In the case of raw products the descriptive card should, in addition to the particulars regarding price, locality, etc., also state the uses to which they are put.

Exhibitions.

Q. 31.—In some quarters there is a belief that exhibitions are injurious to the indigenous manufacturers as they afford an excellent opportunity to foreigners to study and understand all the details relating to any particular industry and thereby compete with the local manufactures. I think it is highly necessary that exhibitions should be organized under the auspices of Government for specially bringing to the notice of our artisans and manufacturers such machinery and appliances as are suited for the local, cottage and other industries. The certificates and prizes awarded at such exhibitions should be well-merited, but in recent years all sorts of exhibitions have been held with the result that people do not value them except as mere show. Government should organize these with the co-operation of non-official bodies and the main object should be not so much to bring buyers and sellers into contact as to demonstrate the progress industries are making and to serve as an incentive to our artisans and manufacturers. In the case of machinery and tools opportunity should be taken to demonstrate their use.

Trade representatives.

Q. 34 *and* 35.—It is of the utmost importance to appoint trade representatives not only in Great Britain, but in all the more important European countries and the Colonies. They should be provided with a collection of trade samples of raw products and manufactured goods—such samples being duplicates of those exhibited in the commercial museums. Such representatives should be preferably Indians well-acquainted with the materials entrusted to them and should also [illegible] the local conditions and of the various industrial com[illegible] representatives are well organized temporary commissions for [illegible] be necessary as they will be able to enquire and report on such [illegible]

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* Note.—The first co-operative society for fish-curing has since been sanctioned by the Madras Government.

Q. 36.—Owing to the present state of ignorance [illegible] manufacturers and consumers alike, it is desirable to have in India [illegible] representatives at important trade centres such as Bombay, Calcutta, Madras, [illegible] Karachi, etc. Specially selected and trained men from the province concerned should be attached to the local commercial museums in these big cities.

Q. 37.—It will be a great advantage to the local manufacturers if Government requirements are made known not only by publication of the list of such articles, but also by exhibiting them in commercial museums so that the exact quality and nature of the articles required may be well understood.

Q. 42.—A properly organized industrial concern in which the public of the locality have the option to invest and which for want of proper accommodation is likely to prove a failure, should be helped by the grant of any available land belonging to Government or if such land is not available private land should be acquired for such a concern under the Land Acquisition Act.

Q. 44 and 45.—Elementary education is the first step to improve the labourers' efficiency. From personal experience of some of the backward labouring classes I am convinced that such of them as have come under the influence of the schoolmaster are much better than the rest. In Madras, for instance, the Buckingham and Carnatic Mills insist upon their half time labour attending the schools specially organized for their education and the results are very favourable. As there is an ever increasing number of youths of these communities who, being obliged to work during the day time for their means of livelihood, are growing illiterate, it is very desirable that the employers, especially the big mills and factories should open evening classes to impart elementary education to them. The fisheries experimental station at Tanur maintains a night school for fisher boys and proposals have been made to open similar schools in the important fishing villages on the West Coast.

Q. 47 *and* 48.—Boys who come out of an industrial school after a few years training acquire some method and more precision in doing their work than the average artisan. It will be very useful to pass through an industrial school before a boy is apprenticed to any trade.

Q. 49.—As the Honorary Manager of the Brahma Samaj Poor schools and the Secretary of the Madras Depressed Classes Mission Society, I have more than 20 years' experience of the night schools for educating the youths of the labouring classes in Madras. These schools have done immense good and I would strongly urge the desirability of opening many more schools. Such schools should be worked with the co-operation of philanthropic bodies or local committees so that the members of such committees may be able to take a personal interest in the boys. Besides a knowledge of the three R's they should be taught drawing with a view to develop the faculty of accurate observation and the training of their fingers. It is for consideration whether provision should not be made in the Factory Act making it obligatory on the part of the factory owners to arrange for imparting elementary education to all youths below eighteen years who are employed by them.

Q. 50.—All industrial schools should be under the control of the Industries Department but where industrial subjects are taught in ordinary elementary schools such schools should be inspected by the officers of the Industries Department.

Q. 51 *and* 52.—Selected men of the artisan classes or others who are actually employed in workshops and factories should be assisted to improve their knowledge and skill in their respective trade by enabling them to go and work in larger factories or workshops in other parts of India or even in foreign countries. Those sent to foreign countries should be placed under the guidance of the trade representatives referred to in answer to question 34. It will be better to have an organization consisting of officials and non-officials and provided with funds who will select suitable candidates for such training in foreign countries. Most of the defects seen in the Indian workmen at the present day are due to their illiteracy and ignorance of modern methods and appliances. First of all they should receive some education and after undergoing the usual training in their respective trades should be helped to go to foreign countries where they will have the opportunity to study the use of modern tools and methods working side by side with foreign workmen in those countries. These men will in due course earn wages and should be able to pay back at least a portion of the amount expended for their voyage and other charges incurred on account of them. After a stay of five or six years they will be able to return home with some money in addition to improved knowledge of their trade. I have had talks with Trade Union people in London and other cities about the training of Indian artisans in this manner, and though in the first instance they naturally raise some objections it is possible to overcome such objections by clear and convincing facts, e.g., if the British workmen have no objection o foreigners such as Germans, [illegible], etc., being employed in various trades in Britain why should they raise any [illegible] the case of British Indians being so employed. The trade representatives or other organisations who are to be entrusted with this work will take the necessary steps to remove such prejudice in the British workmen and mployers. As the war has done much to bring the Indians in nearer sympathy and fellowship with the British public it may be reasonably hoped that the pre-war prejudice will no longer stand in our way.

As hereditary has played an important part in the development of the Indian arti-ans it is very desirable to select candidates to be trained as supervisors from among hese hereditary communities, give them a high school education and have them rained as stated above. I would include among such artisan classes the following—arpenters, gold and silver smiths, shoemakers, blacksmiths (who could be trained ery easily as fitters and mechanics), weavers, metal workers, etc. After being trained hese men should find it easy to carry on their trade as cottage industries without aving the necessity to depend on capitalists to find employment for them. It may be rgued that such suitable candidates are not now available. Yes, but with a little patience it is possible to find them and train them in four or five years. Pecuniary help in the shape of a grant-in-aid and other facilities should be given to managers and supervisors of private factories who have proved themselves capable, to enable them to improve their knowledge in other countries.

Q. 53.—Private industrial concerns which have received Government aid should be made to train apprentices nominated by Government or selected by themselves.

Office organisation.

Q. 57, 58 *and* 59.—There should be an Advisory Board of Industries for each province constituted of officials and non-officials who will study the condition of various industries throughout the Province, scrutinise proposals and suggestions made for developing any of them, organise commercial museums and exhibitions as well as appoint trade representatives, select candidates and arrange for their training in various industries.

* *Q.* 60.—There should be a Director of Industries in each Province who will be assisted by the Advisory Board, and he will be the President of the Board.

The Director should be a non-expert official. It will be impossible to secure a person with expert knowledge of the various industries, a business man on the other hand may get into a groove and not likely to be able to take a wider view of things.

Hence the Director of Industries should be a non-expert official who has a good knowledge of the country and people, together with administrative experience which is highly necessary for co-ordinating the various branches. Such an officer will have no bias and when the local conditions have been investigated by him with regard to the possibilities of starting any industry in a particular locality he will simply put an expert on to it. The Madras Fisheries Department owes its success mostly to the fact that it has at its head an officer who possesses a wide knowledge of the country and people in addition to administrative experience.

Q. 61.—The Board will be an advisory body who will assist the Director and the Director will be the executive officer and will be under the direct control of the Provincial administration.

Q. 62.—There need not be an Imperial Director of Industries but there should be a central research and technological institute to the head of which Provincial Directors of Industries may refer any matter for opinion and guidance. This central institute should print and publish the results of investigations that are being made in various Provinces. Except giving advice he should not interfere with the work of the Provincial Directors.

Technical and Scientific departments.

Q. 64 *to* 66.—See Q. 62 *supra.* The central Imperial technological institute should be able to deal with most of the industrial problems which are submitted to it by the Provincial Directors, and if there is any which cannot be dealt with on the spot, it may be possible for it to consult foreign authorities on such matters. The central institute will also thus prevent overlapping of experimental work, and the results arrived at in any particular investigation could be made use of in any other province. This institute will naturally be under the control of the Imperial Government.

Q. 67.—The expert will be for the time under the control of the local Director of Industries.

Provincial departments.

Q. 68.—It would be better if the Provincial Directors could also have their laboratories, etc., to deal with local problems but for financial considerations it may not be possible to provide them in the near future. Hence the desirability of putting all the resources into a central institute which should be up to date as regards staff and equipment in all its branches. The Local Governments may have to engage experts to carry on any new industry regarding the possibilities of which preliminary investigations have been made by the Director and the Advisory Board with the help of the Imperial technological institute or other agencies. No doubt all the local Directors will have some workshops and laboratories on a small scale for dealing with minor problems in the first instance.

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* See also last paragraph in witness' paper on the training of Indians as seamen and navigators printed at the end of written evidence.

Q. 70.—The experts engaged for any special industry, e.g., an expert in a chemical industry, should be for a limited period. When he has demonstrated the commercial possibilities Government should encourage private parties to take up such concerns and the services of the expert placed at their disposal.

Technological institutions.

Q. 71 *to* 74.—Purely science research institutes such as the Tata institute in Bangalore should not ordinarily undertake industrial investigations, and a research student should not be burdened with the thought that the results of his work may or may not be of any commercial value. These students should be encouraged to carry on their research work apart from such considerations though it may be that industrial experts may ultimately make use of the results of their investigations. Selected students should be given liberal scholarships so that they may be free from pecuniary anxieties and ordinarily no time limit should be fixed.

Co-ordination of research.

It is desirable to co-ordinate the research activities of people engaged in investigations but it may not be possible to prevent overlapping. The central Imperial technological institute (see Q. 64 *supra*) should issue bulletins or other publications which would contain information regarding investigations that are being made by various people and this may prevent overlapping to some extent.

Qs. 75 *and* 76.—The institution of the Indian Science Congress is largely contributing to the creation of desire especially in the young Indian officers of the various Government Technical and Industrial Departments, to carry on original scientific investigations in their respective subjects. As this is a very valuable training Government should encourage such officers to attend the annual sessions of the Congress so that they may become acquainted with people engaged in smiliar work in other parts of India. Apart from the scientific atmosphere which it creates it is not desirable to tax the Congress as a body with industrial problems.

Study of foreign methods.

Q. 77.—Technical and scientific experts who are already in Government service should be encouraged by pecuniary and other help to improve their knowledge by studying the conditions in other countries. Such men who have by actual work proved their capacity will be far superior to the majority of the raw students fresh from the college to whom the Government of India technical scholarships have hitherto been granted. It is often said that these students find it very difficult to get admittance into European factories and workshops, but one of the important causes which prevents them from getting the benefit of such factories is their utter ignorance of even the elementary knowledge of the industry for which they are sent out. I have heard it said that these men could not even make a rough sketch to express their ideas of anything they required and did not even know how to use a screw driver or spanner. They would put so many questions and wanted every little thing to be done for them by others. Such men can never command any attention from an European factory manager or workmen. But on the other hand if the Indian student who is sent to study an industry in foreign countries knew something of it already—the conditions under which it is carried on in his own country—and had also a workshop training in the use of ordinary tools, etc., he would not only be able to command respect but may pick up the required knowledge without any great difficulty. Hence, other qualifications being similar, preference should be given to men who are already in service.

Reference libraries.

Q. 79.—Want of public libraries containing technical and scientific works of reference is being felt by people who are actually interested in industries. A good collection of books on various subjects should be placed under the Director of Industries in each Province and they should be made available to the public for reference.

Colleges of commerce.

Q. 80 *and* 81.—A college of commerce will be the means of training young men in modern business methods, a knowledge of which is almost as important as technical training.

Prevention of adulteration.

Q. 91.—For the newly introduced industry of fish-canning, which requires high class technical skill and care, it is desirable that Government should regulate it by means of inspection, testing, etc., and those factories which do not come up to the standard should be prevented from manufacturing such food products. Similarly fish guano, which is easily adulterated by the admixture of sand, should be subjected to the inspection of Government officers and penalties imposed on those who defraud the consumers and thereby in the long run ruin the industry which has become a very important one in recent years on the West Coast. The Provincial Director of Industries should be empowered to deal with such matters.

Railways.

Q. 97.—Light railways through the interior of the West Coast districts will largely benefit the planting and produce industries.

Waterways.

Q. 100.—Most of our rivers which were at one time navigable to Indian sailing vessels have become useless as waterways, as they are silted up especially at their mouths. Attempts should be made to keep open the bars by dredging.

Indian freight.

Q. 101.—I have heard that Indian merchants find it difficult to send goods to foreign countries owing to their inability to secure freight at reasonable rates.

The remedy is the organisation of ship building and the training of Indians as seamen and navigators. My views on this very important subject of developing the oversea carrying trade of India in which the Indians may have their proper share are set forth in a paper which I contributed to the Indian Industrial Conference held at Bombay in December 1915 a copy of which is printed below.

General.

Q. 110.—As regards the fish-curing industry I would strongly advocate the modification of the rules regulating the issue of duty free salt in the fish-curing yards in this Presidency; they may be made similar to those in force in the Bombay Presidency. As regards the development of the fishing industry generally, the improvement of the economic condition of the fisherfolk is of foremost importance. Organisation of co-operative societies together with loans from Government at low rate of interest to free them from Sowcars, and opening of schools for imparting general instruction and certain special matters connected with their industry, are some of the practical ways in which such economic improvements could be gradually brought about. (Vide Bulletin No. 9 issued by the Madras Government Fisheries Department).

Q. 111.—Ship building which was at one time a very important industry in some parts of this Presidency is almost dying out. This should be revived and modern methods introduced with the aid of Government. See Q. 101 *supra.*

Lecture on Fishery Industry and Economics.

Delivered by Mr. V. Govindan, B.A., F.L.S., *at the Madras Industrial Exhibition in January* 1915.

All along the coast of India and Burma which extends over 5,000 miles we have a number of sea-faring communities who are mostly engaged in the fishing industry but this evening I shall try to confine my remarks to the present condition of the industry as it exists on the sea-coast of the Madras Presidency alone. Thirty-five years ago Dr. Day speaking about our fisherfolk remarked "They are poor and miserable with poverty, are reported to be decreasing in numbers due to cholera or other diseases, emigration, or accepting service as lascars in coasting vessels. These are people who in olden times were among the most prosperous of the inhabitants along the coast, who when the Portuguese first landed were able to bring large armies into the field, whose occupation is now but too little considered by some of our Indian officials—as a civilian remarked that sympathy ought not to be wasted on fishermen for they are an independent careless and drunken set of men." Things have changed for the better since the days of Dr. Day and though there is still much poverty and avoidable mortality among the fisherfolk, and though they are still illiterate, careless and very often addicted to intemperate habits, and though the improvements which Dr. Day so devoutly advocated and worked for with unceasing enthusiasm and energy, still remain mostly unrealised, the fisherfolk may well congratulate themselves on the fact that a paternal Government have seriously taken up the question of improving them and developing their industry. It is with this view that the Fisheries Department has been organised and though it is only 10 years since it came into being its efforts have in some little measure as His Excellency so very sympathetically remarked on the opening day of this Exhibition "reached to the benefit of that large and hitherto perhaps neglected section of our population—our fisherfolk."

In order to understand the value of improvements already introduced and those under contemplation it is necessary to see what is the condition of the fisherfolk or what it was till recently.

Living as our fisherfolk do in isolated hamlets not easily accessible from towns and villages, they seldom come in contact with other castes and as the fishing industry has for ages been looked down upon no one takes any interest in it. Hence most of our countrymen and especially the educated classes know very little of the nature of their occupation, their difficulties, their privations and the dangers they have to encounter. Catamarans and dug-out canoes which are very primitive and fragile, giving hardly any shelter from sun and rain, are the crafts they use in the pursuit of their industry. But nature has been kind to them and disasters which befall the toilers of the sea in other countries owing to sudden storms, seldom happen to them as the seasons of storms and cyclones are more defined on our coast. Nevertheless accidents do happen and our fisher-women have often to cry like the Newhaven fishwives—"It's no fish ye're buying—its men's lives." Our fishermen cannot go out to any great distance from the shore as there is no accommodation in their fragile and tiny craft to carry food and drink or for preserving their catches on board, and they are therefore obliged to return to the shore before sunset, and this together with the great uncertainty of the returns to their labour has a deterrent effect on the industry. And after all what is the remuneration they get for all the risk and fatigue they undergo? In this climate fish cannot be kept for more than a few hours after they are captured and in hamlets which are far from fish-curing yards or thickly inhabited towns, the price they fetch is very small. In olden times the men captured the fish and their womenfolk carried them in the fresh state to interior villages where they were mostly bartered for grain and other food stuff, or they cured them with salt earth which they collected from the saline deposits in the fields. But when the collection of the salt earth was prohibited owing to the introduction of the salt tax, fish curing yards were opened by Government for enabling fish to be cured with duty-free salt which was issued under certain conditions laid down for the purpose of safeguarding the revenue. But most fisherfolk were reluctant to resort to these yards owing to their timidity and the fear that any slight infringement of the rules would result in their being sent to jail. The result of this was that petty merchants belonging to other castes took advantage of it and started fish-curing. With cheap salt at their disposal and with fish which the fisherfolk were obliged to sell them at cheap rates owing to their inability to cure them themselves, these men were enabled to make large profits and to that extent the fisherfolk were deprived of their due share of the profit resulting from their industry, and they gradually became indebted to these outsiders. This unfavourable result has been brought about by the action of the fisherfolk themselves, and it will take a long time for them to regain their independence but in the meantime most of them have to depend on the earnings of their male members alone for their livelihood, which is hardly sufficient considering that for generations the conjoint efforts of the men and women have been required to support the family and to keep the pot boiling.

The fisherfolk are a thriftless people who have no idea of the value of money: they spend it as soon as they get it. This characteristic may be due to some extent to the fact that they capture at times heavy catches of fish and thereby get a lot of money and hope they will have the same luck every day. They borrow money in case of bad seasons and also for buying boats and nets from the above described petty merchants or other middlemen at exorbitant rates of interest or on other stringent terms, e.g., in some places a fisherman who borrows has to pay the lender for every Rs. 200 borrowed, a sum equal to the daily earnings of a man working his nets and boats which may vary from As. 2 to Rs. 25 per day. In some other places all the fish landed by the borrower must be sold to the lender at 10 to 25 per cent less than the current market price. Moreover as the lender will not accept repayment of the loan in small instalments and as the fishermen seldom can save a lump sum it remains a permanent debt growing from father to son to the great disadvantage of the borrower. The rate of interest is sometimes as high as 36 per cent or even more in case of failure to repay at the stipulated time. With a view to remedy this state of everlasting indebtedness, the Fisheries Department have been preaching to the fisherfolk in certain localities about the advantages of co-operative societies and after four years of constant talk a society was formed and registered last year at Tanur and another is in the course of formation at Tellicherry. Unlike ordinary credit societies, the members of these fishermen's societies are compelled to pay small monthly contributions for a limited period and thus create their own capital. The growth of such societies must necessarily be slow but considering the thriftless character of the folk it is better to wait than borrow money from other sources. The management of these societies is a very difficult task as most of the members are illiterate and in some villages it is even impossible to get a sufficient number of intelligent men to form the panchayat or to serve as office bearers.

We often hear it said that it is very difficult to persuade our ryots, our artisans, our weavers or our fishermen to improve their respective industries by the introduction of modern scientific methods and appliances as practised in other countries. So far as the fisherfolk of our West Coast are concerned it is pleasing to note that they have disproved this remark to some extent. No doubt they don't rush to copy an example simply on seeing it demonstrated on a small scale, but when they see that there is money to be made, no serious persuasion is needed to make them take up a good example. I shall mention two incidents to illustrate this. Some 25 years ago when the huge shore seine known as Rampani was newly introduced and operated at Malpe by some Goanese fishermen, the local fishermen were greatly annoyed and opposed its introduction tooth and nail which resulted in rioting and the sub-magistrate of the neighbourhood had to hold his court in the fishing village for weeks together till peace and order were restored. But since then the local fisherfolk have found out that this new net is very effective to capture the large shoals of sardines and mackerels which visit their shores; there are record catches of a single haul which realized a couple of thousands of rupees and though it is a very expensive net costing three to five thousand rupees per set and requiring 50 to 60 men to work it, they have adopted it very largely and have almost discarded the types of nets which their fathers used for catching same kinds of fish. A Rampani net is about a thousand fathoms long and is made up of a number of separate pieces and hence it is mostly worked on a co-operative basis. Each of the 50 or 60 men contributes his bodily labour and a number of pieces of the net which when laced together form the complete net, and the sale-proceeds of the fish captured are divided among them. The second instance is that of the manufacture of fish-oil and guano. Till recently the large quantities of oil sardines available on the West Coast used to be converted into manure by the wasteful, primitive and offensive method of sun-drying on the open beach. This method was very prejudicial to all concerned; it made the locality very insanitary and the offensive stench it created was so intolerable that a European gentleman once humorously called it "the first line of defence of the coast." Moreover by being thrown on the beach when the fat melted a lot of sand adhered to the fish so much so that 30 per cent was not considered a very bad sample which meant that for every 100 bags which the planter bought he had not only to pay for 30 bags of sand for which he had no use but also pay all the incidental charges such as bagging, carting, rail freight, etc., on those 30 bags. Moreover, it retained a high percentage of fat which made it a low grade manure, as fat is not required for plant life. But in 1909, the department introduced a new method of treating this fish for manure and it has been largely copied by the people. This is a simple process in which the fish is boiled in open iron vats and the boiled stuff is put in coir bags and the moisture and oil pressed out by means of a hand screw press. The resulting cake after drying in the sun becomes a very good fertiliser known as fish guano and the oil is a valuable article of commerce largely used in various industries such as jute batching, leather tanning, candle and soap making, paints, steel tempering, etc. In less than five years, this industry has grown beyond our expectations and there are at present on the West Coast nearly 250 factories for treating sardines in this manner, but the most interesting point is that the majority of these factories are owned and worked by the ordinary fisherfolk themselves who had previously never known of these methods. The cost of a factory varies from Rs. 2,500 to Rs. 4,000 or taking a low average of Rs. 2,500 per factory, the total investment in this new industry by our people comes to more than six lakhs of rupees. The department had only to demonstrate the method of manufacture and give the people the necessary information about price and markets. How the trade in these two commodities—oil and guano—has been steadily increasing is shown by the following figures taken from the export returns?—

—	Fish oil.		Fish guano.	
	Quantity.	Value.	Quantity.	Value.
	GALLONS.	RS.	TONS.	RS.
1910–11 ..	72,880	52,630	188	18,648
1911–12	120,321	77,564	267	17,866
1912–13	66,986	46,775	1,872	1,54,916
1913–14 . ..	377,744	2,29,014	4,726	4,03,787

The year 1912-13 and the last two seasons (1914 and 1915) were failures owing to the non-arrival of fat sardine shoals on the coast and hence the reduction in the output. Though such valuable manure is manufactured on our coast, it is a regrettable fact that the major portion of it is exported to fertilise the fields in Japan and other foreign countries, but steps are now being taken with the aid of the Agricultural Department to introduce this among our ryots and a few persons who have tried it have already found out its value. As illiterate fishermen have been able to appreciate the value of improved methods in its manufacture, we may reasonably hope that the illiterate ryot will also open his eyes to the benefits to be derived by using it for his crops.

All fisherfolk, no matter where they are, are imbued with an abundant feeling of superstition which passes for religion, but in the case of some of our fisherfolk this superstition has a bad economic effect on the industry. On the Ganjām and Gōdāvari coast, for instance, they worship a large number of gods and goddesses as well as their deceased ancestors who are represented in wooden and clay figures of various shape and size—one of them being the figure of a "Bengali Babu wearing a hat and riding a black horse." I don't know how a Bengali Babu came to be worshipped as a god by the fisherfolk. Offerings of goats, pigs, fowls, flowers, arrack, toddy, etc., are made to these gods and goddesses before using a new boat or net, before fishing operations are undertaken, both when good catches are landed and when fish is scarce and when there is fear of an epidemic. Much money, mostly borrowed, is spent in this way and all fishing is stopped for days on such occasions and as there is much drinking they acquire intemperate habits. Even the fisherfolk who are converts to Christianity and Muhammadanism are not free from superstitious practices.

The condition of the fishing hamlets all along the coast is very pitiable. They are mostly situated far away from towns without any roads or other proper communications and the sanitary surroundings are of the rudest and scantiest description even in the case of hamlets that are within or in easy reach of municipalities. The fishing hamlet situated in front of the Cocanada Bunder is a typical example where such conditions prevail. All the fish offal and other dirt are thrown without any regard to sanitation all over the place and the stench produced by the putrefaction of such animal matter is wafted over that flourishing and thickly populated city from one end to the other. If the authorities of the place will devote a little attention to this spot all the putrefying and decaying matter which is now a nuisance and danger to health can be easily converted into useful manure. This class of manure prepared from fish offal and prawn skins will fetch [illegible]

Rs. 35 to Rs. 40 per ton ex-factory. Large quantities of prawn skin manure are exported from the West Coast—the quantity exported in 1914-15 being 580 tons valued at Rs. 32,228—most of which like fish guano goes unfortunately to Japan viâ Colombo.

The illiteracy and the consequent ignorance of the fisherfolk as in other industrial communities are fundamental causes which militate against the attempts made to improve the fishing industry and make it not only profitable to the hard toilers of the sea but also contribute directly or indirectly towards the increase of the food supply of our country. Our fisherfolk taking them all over will compare most favourably with other classes as regards the industry of the men and women and they cannot be accused of being lazy, but the ignorance which they share with other communities similarly circumstanced, is the main cause of their backward condition. In most European countries as well as in Japan fishermen and seamen are specially trained for their arduous occupation. For instance in Belgium—that brave little country which has suffered so much in this terrible war—almost every seaport town maintains institutions for the training of fishermen known as Ecoles professionelles de peche subsidees par l' Etat (i.e., professional fishery schools subsidised by the State) as well as the higher navigation schools at Antwerp and Ostend. The syllabus of study includes a knowledge of language (French and Flemish), arithmetic, geography, physiology, hygiene, and such technical subjects as the elements of navigation including rules of the road, signalling with flags and lamps, telegraphy including wireless, making and mending of ropes and nets, structure and working of steam engines and boilers. The lads are also sent out in fishing vessels to serve as apprentices in order to gain practical experience. In India we have hardly begun to study the industry but the Department has already started a small technical school at Tanur where the fisher lads when they return from sea after their day's labour are taught the three R's and some technical subjects such as the making of twines, mending nets, carpentry and the curing of fish according to improved methods. Matters relating to sanitation, education, medical aid, communication, etc., are beyond the purview of this department but wherever such defects are noticed or wants are felt the matter is brought to the notice of the proper authorities and attempts made to improve matters.

Intemperance which is so much prevalent among the fisherfolk coupled with their thriftless habits, keeps them always in want. Men, women and even little babies must in some places have their drink of toddy. Often I have seen mothers giving toddy to their little infants and on questioning them about it, you will get the reply that it does good to the little ones. The truth is the little mite gets intoxicated and falls fast asleep allowing the mother to attend to her work undisturbed for hours together till it wakes up from this unnatural sleep. The Department has been endeavouring to spread ideas of temperance and thrifty habits by the organization of societies. There are already several fishermen's temperance societies in some of the fishing hamlets of South Kanara which are doing good work and as they have strong caste panchayats, it is hoped that this useful work will spread. Two years ago the headmen of the Moger caste in the northern parts of South Kanara passed a resolution at their caste conference enforcing temperance among the members of their community. They adhered to the resolution for several months but gradually owing to the influence of the toddy vendors who suffered heavy loss as the fisherfolk are their best customers, they again began to drink. Nevertheless the leaders of the community have not lost hope. There is a temperance society at Malpe which in addition to stopping drink has also undertaken the collection of sums of money which the members have saved by giving up drink. This society, which has only 70 members on its rolls, has been, during less than the two years it has been in existence, able to collect more than Rupees 600 in this manner, and the money thus collected is given out on loan to the members at a low rate of interest. Attempts are also being made to enable these associations to open night schools in their villages. Fisher boys of even 5 or 6 years of age go out with their elders for fishing, not necessarily to earn any wages but to be trained in their hereditary occupation as they consider that such early training is very necessary to make them fit for their arduous toil. Even when they do not go fishing, they have other employment during the day time such as twisting and preparing cotton and hemp, making and mending nets, ropes, etc., and it is impossible for the large majority of the fisher children to attend the ordinary day schools. Hence the need for night schools where they could be taught to read and write after they have finished their day's work.

Fishing industry occupies a prominent place in almost all the maritime countries of the world where even aristocrats and kings have invested money in it, e.g., the good King of Belgium is the patron of a fisheries institution known as the "Ibis" which owns a fleet of fishing vessels. In India it is not only neglected but even considered to be *infra dig* for any decent person to undertake. The reason for this is not far to seek. As already stated fish in the tropics cannot be kept in good condition for more than a few hours after they are dead, and as our fishermen are not provided with boats of sufficient speed to land their catches quickly and as there are no means of rapid conveyance to consumers, the fish when it reaches the bazaar is already [illegible] a bad smell. If such fish cannot be sold as fresh, they are salted, but the tainted smell once produced sticks to it or even becomes worse. Such commodities cannot command any respect and it is no wonder that decent people have abstained from dealing in it. Within certain municipal areas the storing of such fish is treated as an offensive trade and those who deal in it have to take out a license paying a heavy fee. Practically the salted and dried fish which is now sold in the bazaars and which is so largely availed of by our masses and even by the classes as food, is treated by the sanitary authorities in the same way as they treat raw skins, and hides or other evil smelling things such as manure, etc., and I think they are not far wrong. In this exhibition there are some samples of salted fish cured and dried according to improved methods and you will not perceive any smell coming out of them. That shows that with a little care and labour it is possible to cure our fish in a much better manner than is at present practised. To popularise such improved methods, it is necessary to educate the consumer more than the curer, for if the consumers will not accept any fish that is not properly treated, the curers will as a matter of course adopt those methods which this Department has been trying to introduce.

Before concluding I would request you not to go away with the idea that the Fisheries Department have done anything extraordinary. We have after all only touched the fringe of a big and important food-producing industry, and it may take many years before anything substantial in its development is seen, especially by people, who have hitherto paid no attention to it and who know nothing of its condition. But more than all the efforts of the Department, we require the school masters' patient and noble services to stimulate the dormant powers of the fisherfolk to enable them to understand correctly and to follow intelligently the advice given by experts. At present there are hundreds of fishing villages all along our coast where you will not find even a single individual who can read or write, and whenever they have anything to be read or written they go to the village Komatti who keeps a bazaar or to the influential toddy vendor in the neighbourhood. It is an often repeated and common place remark that no industry can be developed without developing the condition of the people who are engaged in it. The late lamented Mr. Gokhale is said to have expressed the opinion that if compulsory primary education could not be enforced throughout the country, he would at least be satisfied if it was introduced in areas where there are 20 per cent of the children of school-going age already attending schools. That is progress no doubt—but in the line of least resistance, and I beg to differ from that great man. If our industries are to attain anything like steady and progressive development it is of the utmost importance that our industrial and artisan classes who are struggling in ignorance and want, should receive the benefit of elementary education which is the only panacea for all the evils they suffer and the sooner it is undertaken the better and easier it will be.

The Training of Indians as Seamen and Navigators.

(A paper read at the Indian Industrial Conference 1915 by Mr. V. Govindan, B.A., F.Z.S., Assistant Director, Madras Government Fisheries.)

This is a subject which has hardly received any adequate attention at the hands of the leaders of public opinion in this country. Unlike agriculture and other industries the seamen's occupation is from its very nature, comparatively unknown to and does not form a subject even for academic discussion by our educated classes, but it is a wonder why our merchant classes have not taken an interest in it, considering the large volume of commodities imported and exported by them by sea. With the exception of the efforts made by Mr. Muhammad Yusuf Ismail, who has been maintaining since last year a small training ship in the Bombay Harbour for the benefit of the sons of our Indian seamen, no serious attempts have been made to give our sea-faring folk a scientific training in their hereditary profession according to modern requirements. Hence it is all the more creditable to Mr. Yusuf Ismail that he has undertaken at his own expense to organise a scheme which is "calculated to raise the status and accomplishment of our Indian seamen," and to the Government of Bombay who have welcomed his proposal with the support and encouragement it deserves. It requires no elaborate statistics to prove the huge volume of trade, which India carries on with almost every corner of the world. The following statement shows the number and tonnage of vessels which entered from and cleared to all countries during the five years ending 1912-13:—

	Number of vessels.	Total tonnage.
1908–09	8,001	12,910,823
1909–10	8,042	14,597,091
1910–11	8,435	14,984,528
1911–12	8,868	16,616,435
1912–13	8,737	[illegible],451,985

The number of such ocean-going vessels for the same period are distributed under the following flags:—

	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.
British	4,238	4,722	4,751	5,117	5,129
German	437	455	419	412	508
Austro-Hungarian	156	220	205	218	245
Japanese	79	63	77	121	197
Norwegian	106	95	104	184	131
Italian	76	81	84	83	90
French	55	56	56	58	47

This includes, no doubt, steamers belonging to the Indian Steam Navigation Companies, which are mostly coasting steamers, but their number is insignificant as compared with those of foreign nations, whose number and tonnage, as can be seen from the above statement, have been steadily increasing. It is therefore high time for India to step in and claim her due share of her over-sea-carrying trade. Attempts have been made from time to time to organise the so-called "Swadeshi" Steam Navigation Companies, which have ended mostly in such disastrous failures as to discourage our country-men from venturing again into that business. And before further steps are taken in that direction the real causes of such failures should be found out. It has been said that they failed because of the keen competition from the existing steamship companies. It is no doubt a true statement, but it is not the whole truth and unfortunately most people draw wrong conclusions from it. Competition is the soul of modern industrial developments and every one who enters into an industry not only courts competition but also competes. Have not the humblest weavers, smiths and others artisans of India to compete with their modern rivals in various countries backed with enormous capital and scientific resources? They no doubt do not come across the operations of their powerful rivals and do not know who they are, but a steam navigation company has its rivals at its very doors and having to face them at close quarters is comparatively unnerved. But the real cause of such failures is due to the lack of necessary knowledge in the management and particularly to the want of Indians who are trained in the art of modern navigation and technical skill to take charge of their vessels. The organisers of such companies hitherto depended on Indian capital, but that alone without Indian brains to run it and Indian seamen to navigate their vessels, was not enough to bring them success. The history of the development of the mercantile navy of Japan is a valuable example and indicates how India should develop hers. The Japanese were not expert navigators a century ago, and depended upon Chinese bottoms to carry their commodities to distant lands, whereas India by the technical skill and perfection which her seafaring people attained in their calling from time immemorial occupied the proud position of "the queen of the Eastern seas." India still possesses the descendants of those early navigators who are still engaged in their hereditary calling, though without any modern scientific training. All along the Indian coast from Baluchistan to Chittagong there are various sea-faring communities who carry on the coasting trade in their almost primitive sailing crafts such as dhows, buglows, kottias, pattimars, dhonies, schooners, etc., some of them going so far south as Zanzibar and to the East as far as Singapore, and as they are able to sail their vessels safe in these distant oceans depending as they do entirely on their instincts unaided by any modern scientific instruments and appliances, it may be safely presumed that with the necessary training in up-to-date scientific methods they could be made as capable navigators as any other people. We have decidedly the right sort of men and all that is required is to educate them and train them in the proper way. The first thing that Japan did when she began to organise her carrying trade was to train up her own men in modern methods. For this purpose selected men after a preliminary training were sent to serve on foreign vessels till they acquired the necessary knowledge and experience to man and navigate their own steamers. Japan and other maritime nations have established institutions for the special training of their navigators and seamen. Take for instance the example of Belgium, that dear little country that has suffered so much in this terrible war. Almost every important seaport in Belgium maintains institutions for the training of fishermen and seamen known as Ecoles professionelle de peche subsidees par l'Etat (professional fishery schools subsidised by the State), l'Ecole de pupilles de la peche as well as the higher navigation schools supported by the State at Antwerp and Ostend. The first of these are types of schools engaged in the professional education of young lads who may become fishermen, but as every fisherman ought to have a knowledge of navigation the programme of study includes a knowledge of language (French or Flemish) arithmetic, geography, hygiene and such technical subjects as elements of navigation including rules of the road, signalling with flags and lamps, telegraphy (including wireless in advanced classes), making of ropes, nets, etc., structure and working of a steam boiler and engine. The lads are admitted into these institutions when they are about

10 years old and have already passed through the ordinary elementary schools and learnt to read and write. After being trained for about 6 years in these institutions they are sent out as apprentices in fishing vessels for further practical training and experience; and on the completion of their apprentice course are examined by a Board appointed by Government who grant them certificates of competency to serve as regular hands on board fishing vessels. After serving as seamen or engine room hands for a few years more those who wish to undergo a further course of training join the higher schools of navigation and pass out as qualified navigators and marine engineers. It will be seen that general education is an important factor in imparting a thorough training and in India also the same should be done and the pupils taught English and the general subjects before their technical training commences, especially in the case of pupils who wish to undergo the higher courses in navigation and become masters of ocean going vessels. Such institutions can be established in India without any serious difficulty and the sooner our public spirited men undertake it the better it will be.

(*To be read in connection with answer to Q.* 60.)

We had experience of a big fishery concern in this Province proving a failure though it was run by a company with the assistance of a business man of great ability and with the help of scientific experts. They failed mainly because they had no knowledge of the local conditions. Though a big company, backed by business ability, expert skill, and financial resources, failed, the same industry is now being carried on by nearly 250 small factories on the coast under the guidance of the Fisheries Department. As for business men getting into a groove and not being able to take a wider view of things the following may be cited as an example. The European firms on the coast who have been supplying manure and other requirements to the planters have, for more than half a century, been buying fish manure prepared according to the most primitive, wasteful, and offensive method of sun-drying on the open beach. This unavoidably contained a large proportion of sand and a high percentage of fat which made it a low grade manure. Though the manufacture of fish manure by the simple method of boiling the green fish and extracting the oil from it has been carried on in other countries and apparently known to Europeans, no attempt was ever made to introduce such improved methods on the coast but they were satisfied with what the ignorant fishermen supplied them.

ORAL EVIDENCE, 2ND FEBRUARY 1917.

Sir F. H. Stewart.—*Q.* How long have you been an Assistant Director of Fisheries?—*A.* About the middle of 1908, I was appointed as Personal Assistant to Sir Frederick Nicholson. After I returned from Europe in 1914 I was made an Assistant Director.

Q. After you joined as Personal Assistant, you went to Europe to study the question?—*A.* I was sent to Europe by Government.

Q. To what particular places did you go specially?—*A.* I went all over Great Britain and Ireland. I have been up in Norway as far as Bergen. I have also gone to Holland, Belgium, Germany and France. I know the Brittany coast.

Q. On what sort of lines did you set to work?—*A.* I went to see the things for myself.

Q. To find out their methods?—*A.* Yes. I went out fishing myself to learn the thing.

Q. You tell us quite clearly in your evidence about the difficulties that at present exist in regard to the existing agencies for financing the fishing industry. It looks very unsatisfactory and very hard on the people who are engaged in it and your remedy is to start co-operative societies. Have you got any co-operative societies already established?—*A.* We have got two established and last week I have sent in an application for the starting of another.*

Q. Is that for fishermen only?—*A.* Yes.

Q. Is it for purposes of credit or to help them to market the fish?—*A.* It is mostly for credit purposes. They are not encouraged to borrow money from the central banks. We are trying to make them create their own capital. We make them pay monthly deposits of one rupee or half a rupee and thus they have to create a capital of their own. It will take four or five years by the time that they are able to collect a decent sum.

Q. Is the society to help them in any other way?—*A.* As the money comes in we distribute them in small loans.

Mr. C. E. Low.—*Q.* Is that obligatory saving or contribution towards the share?—*A.* It goes towards the share capital.

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* Since this evidence was recorded eight more societies have been organised.

Sir F. H. Stewart.—*Q.* You tell us about the fish canning factory which you describe as being both a pioneer factory and also a demonstration factory and you think that it is very useful as a demonstration factory. Do the people round about who are engaged in the industry come and see how the things are worked?—*A.* We do not encourage the ordinary people to take up the canning industry. It requires a good deal of scientific knowledge. It would not do to encourage the ordinary fisher folk to take up such a delicate industry.

Q. It is hardly a demonstration factory then?—*A.* We have got a European firm now who have taken it up as a big concern. But there was an old factory managed by a Frenchman in Malabar itself, in Mahe. Those people wanted to sell it off and for a long time they were not able to get any purchasers. The present people came out and were guided by the success of the Government fisheries. That was not thought worth doing by others. So they were encouraged to take it up.

Q. Are they Europeans?—*A.* Yes. The manager of the factory has applied to us several times and we have been giving him a lot of information.

Q. Are they a local firm?—*A.* They are a Madras firm of importance.

Q. You are the honorary manager of the Brahmo Samaj Poor schools and the Secretary of the Depressed Classes Mission Society. You take a great interest in the work of night schools for helping poor people. Do you find that night schools are successful, that the boys and young men who come to them are able to pay their full attention to studies after they have been working all day?—*A.* We give them half an hour or an hour. In the beginning they feel it somewhat difficult to attend but gradually they take to it. They could easily attend for an hour or half an hour.

Q. What do you teach them?—*A.* We teach them reading and writing the vernacular and arithmetic. If boys are very earnest we also teach them to read and write English.

Q. You do not teach them any technical subjects?—*A.* Our efforts are confined to Madras. We have got the boys employed in various factories.

Q. You refer to the desirability of Government inspection and certificates of quality with reference to the fish canning industry to prevent adulteration. Is there anything of that sort now in existence at all?—*A.* No.

Q. Cured fish however bad it may be may be sold?—*A.* Yes. In fact ordinary fish-curing is considered an objectionable trade. Exporters if they want to store edible fish within Municipal limits have to take out a licence paying heavy fees.

Q. You then say 'As regards the fish-curing industry I would strongly advocate the modification of the rules regulating the issue of duty free salt in the fish-curing yards in this Presidency and that they may be made similar to those in force in the Bombay Presidency.' What are the rules in force there now?—*A.* There are about 120 fish-curing yards all along the coast. In the west coast there is a larger number. The fishermen have to bring their fish after being cleaned into the enclosures where the Government Salt Department issues salt at a fixed proportion for the various kinds of fish.

Q. Have they got to be cured in the Government yards?—*A.* Yes. It has got to be kept for a night and then it is taken out of the salting tubs the next day and dried and it will be allowed out of the yard only on the third day. In Bombay there are no strict rules regarding the proportion of salt. In Bombay a quantity of fish is brought by a curer and he says that he wants so much of salt, half a maund or one maund or whatever it is. The officers do not care to know what proportion he is using for a particular quantity of fish. He is at liberty to take it away after eight or ten days or even earlier.

Q. He has to take his fish to the Government yard?—*A.* Yes. He is at liberty to take it away even the very next day. These people being small capitalists or no capitalists at all, they want to dispose of their goods as quickly as possible. All these rules have been made to protect the interests of the revenue.

Q. You refer to education again and you say that the department has already started a small school at Tanur where the fisher lads when they return from sea after their day's labour are taught the three R's and some technical subjects. The fishing hours are very long. Don't they go away at day break?—*A.* Yes.

Q. When do they get back?—*A.* By noon or 1 o'clock. Or sometimes it may be the other way. They may go out in the noon and come in the evening. Sometimes they go in the night and come in the morning. There are no fixed hours.

Q. Are they taking advantage of the school?—*A.* We have got a sufficient number of boys who are quite intelligent and who have improved considerably.

Q. Do you think that the fishing classes are taking advantage of this school and that their level of intelligence is rising?—*A.* The school is only of two or three years standing.

Q. But is that not your idea, that if you give them a little elementary education, get them out of the clutches of the money lenders and make them shake off the propensity to drink, you could greatly alleviate their condition?—*A*. Most of them are Muhammadans at Tanur and they do not drink. But all the same they spend the money in some way or other as soon as they get it.

Mr. C. E. Low.—I should like to confine myself now to the west coast. Are there any primary schools for these fishermen's children?—*A*. They are very few. There are hardly any schools in the fishing villages. In big cities like Calicut and Tellicherry the Municipality maintains small schools, not necessarily for the fisher boys.

Q. Do a number of the fisher boys attend the Municipal primary schools in Calicut? —*A*. Yes. A small number of Hindu fisher boys but hardly any Muhammadan boys.

Q. Are there any in Beypore?—*A*. No school.

Q. They do not go to school there?—*A*. Very few go.

Q. Where is the nearest school?—*A*. About two miles away.

Q. Is that considered out of the way for the boys?—*A*. For most of the boys it is out of the way.

Q. Do you think that pressure should be brought to bear?—*A*. As far as this coast is concerned there is no necessity for any pressure at this stage.

Q. Then as regards secondary education in how many places on the Malabar coast are there middle schools to which boys are likely to go?—*A*. They are in Mangalore, Tellicherry, Cannanore, Calicut and Cochin.

Q. Is the middle school maintained by the municipality?—*A*. Yes.

Q. And high schools?—*A*. Most of the Municipalities have got high schools.

Q. Do the fisher classes take advantage of these?—*A*. Very few.

Q. Do the more well-to-do among the fisher folk try to get their children superior education?—*A*. Yes. Very few of them.

Q. Do they send them to high schools?—*A*. Only very few.

Q. What are the things that you have tried to teach them?—*A*. We have tried to teach them such things as the mending of nets, the making of nets, making twines, carpentry, the curing of fish and such other subjects.

Q. And do they get any literary training?—*A*. We teach them the three R's. We cannot get them always. We get hold of them when it is convenient for them.

Q. Do you teach them to repair nets and make strings by their own indigenous methods or by improved methods?—*A*. We teach them slightly improved methods. We have got a net machine for their use.

Q. You say that you have corresponded with the Imperial Institute in London. You also say that business people do not resort to it so freely because it is away from the business centre. Have you ever had anything to do with the Commercial Intelligence Branch of the Board of Trade which is located in the city of London?—*A*. All that we have got from the Commercial Intelligence Branch is the addresses of some business people. We sent samples of our oil to the Imperial Institute and they were exhibited. When we advertised that in London we came to know that though samples are exhibited there business men asked that samples may be sent out direct to them.

Q. The Commercial Branch of the Board of Trade hold exhibitions at which people attend?—*A*. We have never tried that.

Q. Don't you think that would be a good thing to do?—*A*. Yes. There might be more possibility of success.

Q. It would be useful if you had a place somewhere in London where you could exhibit some of your samples?—*A*. Yes.

Q. What sort of things in particular?—*A*. Fish oil, and fish meal or guano to some extent and other fishery products, e.g., fish maws.

Q. That is only because you cannot get your market for fish meal in this country?—*A*. There is an export trade to the East.

Q. Don't you think it would be much better if you could sell it in this country. If you cannot do it, the Agricultural Department could do it for you?—*A*. They are trying it as manure. Even this guano, if it is prepared with greater care before the fish gets tainted can be used as cattle food. I was told that in the southern parts of Russia the peasants use fish meal as food.

Q. You say that you are the Honorary Manager of the Brahmo Samaj Poor schools and the Secretary of the Depressed Classes Mission Society. Where are these bodies working?—*A*. In Madras. We are trying to persuade the mufassal people also to do such work.

Q. To a great extent the boys that come are usually children of the mill hands and so forth?—*A*. Yes.

Q. Have you come across any of the boys working in the Buckingham and the Carnatic Mills?—*A*. They mostly deal with them themselves. We have also got a school in that neighbourhood.

Q. Have you seen anything of the effect of the Buckingham and Carnatic Mills on the boys in their after life. Do they turn out a better class of boys, a better class of workmen?—*A.* I do not know as regards their being better workmen. Their behaviour is quite improved. There is no doubt about that.

Q. What sort of things do you teach in these Madras schools?—*A.* We teach only literary subjects such as reading, writing and arithmetic. We have got our whole time workers also who lecture on various subjects such as hygiene, temperance and so forth. We get hold of the parents also.

Q. Do you get the parents to come to these night schools?—*A.* We have men of even thirty-five years of age attending. But that is very rare.

Q. In your answer to questions 64 to 66, you say that the central research institute will prevent overlapping of experimental work and that the results arrived at in any particular investigation could be made use of in any other province and then you say in answer to questions 71 to 74 that the central Imperial technological and science institute should issue bulletins or other publications which would contain information regarding investigations that are being made by various people and that this may prevent overlapping to some extent? Do you realise that if you give each province its own set of experts, there is bound to be overlapping?—*A.* As regards investigations, if a person has taken up some investigation, you cannot stop him and say that some body else is doing it. What I meant was that there might be co-operation. A person may be doing some investigation in Madras and you cannot possibly prevent another person in Bengal who may be doing the same investigation.

Q. Don't you think it would be waste of money and staff unless there is some organization which will co-ordinate the activities of the various provinces?—*A.* Yes. A central institute like that might ask the different people in the various parts of the country to take up particular lines of investigation.

Q. Supposing one local Government want to entertain a certain expert who is also wanted in another province and supposing that the two provinces both entertain the same kind of expert?—*A.* If there is no work then they should not entertain the men. As regards industrial work, I think there will be sufficient work for most of the experts.

Q. Suppose a local Government wants to entertain a glass expert and another local Government also wants to entertain a glass expert, would it not be better that the two glass experts should be made available for the service of all the local Governments?—*A.* I think the local Governments must have their own experts.

Q. Take glass for example. We have got a man for the United Provinces who calls himself a glass expert. The Government of India calls him so. You cannot have such a man as glass expert because he cannot be an expert in all kinds of glass-making. There are many kinds of glass-making which we want to introduce in this country.

Q. Would it not be a waste if all the provinces entertained the same kind of glass expert?—*A.* Will the different provinces have the patience to wait? I think the experts might be in some central institute where they may try experiments that are required for the various provinces. The different provinces might have their men trained there.

Sir D. J. Tata.—*Q.* Could you tell us a little more about the fish manure,—how it is prepared, how it is sold and what sort of market you have created for it?—*A.* There are two kinds of fish manure. The fish manure is got principally out of the sardine, and at times enormous quantities of sardine fish are caught on the west coast. At certain seasons they become very fat, and then it is difficult to cure them with any salt, or even if cured it cannot be stored away for many days. They become brittle and the whole thing becomes a pulpy mass owing to the presence of the fat. Hence people dry it as manure on the beach as soon as the boats come in by simply scattering it on the sand. The sardines are about seven or eight inches long. They allow them to dry for two or three days. They then gather them and weigh them and send them away. They are then sold.

Q. Simply the fish is sold?—*A.* Yes, after it is dried in the beach.

Q. It is then sold as manure?—*A.* Yes.

Q. For how long is this going on?—*A.* This is going on for the last 40 or 50 years.

Q. And by whom is this used as manure?—*A.* By the planters. It is sent mixed with other things according to the requirements of the planters. More than 75 per cent is exported to Colombo and also to Japan.

Q. Does Colombo act as a port of call?—*A.* There is certain home consumption in Colombo also.

Q. On what crops are they used?—*A.* Coffee and tea plantations.

Q. And the planters there use it?—*A.* Yes.

Q. Is that dessicated?—*A.* It is not dessicated by the exporter. They have got agency houses who supply the planters. They have got several mills.

Q. They grind it into meal?—*A.* It becomes almost powdery. They mix it with ashes. There is a lot of sand—20 to 30 per cent which adheres to it and this cannot be easily got rid off.

Q. How do they make guano from it?—*A.* By boiling the fish in special vats, and then you can skim off the first class oil on the top. You get a light coloured oil, and the residue is put in coir bags. They are simply squeezed in hand presses.

Q. And that forms the fish guano?—*A.* Yes.

Q. That is not again cut up?—*A.* It does not want to be cut up again.

Q. There is no mixture of anything else?—*A.* They mix it according to the requirements of the planters. It does not want much handling afterwards. It is a very light powder and even in the course of packing it breaks up.

Q. You also talk of the outer coverings of the prawn shells. Is that also a good manure?—*A.* Yes, for fruit trees. A large quantity of prawns is also caught in the backwaters. The local people catch these. They dry it and then take off the shells and separate the flesh. The flesh is largely exported to Burma, and the shells are sold as manure.

Q. In answer to question 110 you say ' As regards the fish-curing industry I would strongly advocate the modification of the rules regulating the issue of duty free salt in the fish-curing yards in this Presidency, and that they may be made similar to those in the Bombay Presidency. Can you tell us exactly what the rules are?—*A.* We have got that out.

Q. Could you let us have a short note on it?—*A.* Yes.*

Hon'ble Sir R. N. Mookerjee.—*Q.* In your answer to question 9 you say that the fishing industry has been hampered by the existing financial agencies and you describe the difficulties of fishermen who are in the hands of Sowcars. Don't you think that an Act would be very desirable to remedy this state of things?—*A.* The best way is to form co-operative societies. Government will advance money to such societies and individual members could borrow from the society.

Q. Don't you think an Act would help?—*A.* I do not think that legislation would be very suitable.

Q. In regard to your idea of sending people like fishermen and blacksmiths to England and other countries, you say that you could educate them and send them to England with scholarships. Don't you think that these men will come with swelled heads and would not work with their hands?—*A.* Some of them may. But most of them will be better for it.

Sir F. H. Stewart.—*Q.* Whom do you want to send? Is it the workmen or the supervisors?—*A.* I would send both.

Hon'ble Sir R. N. Mookerjee.—*Q.* Will not the ordinary workman who goes to England come back with a swelled head?—*A.* Some of them might.

Mr. A. Chatterton.—*Q.* Could you not get the kind of man here?—*A.* I shall express clearly what I have got to say. I came across a German in England, an engraver. He was getting about Rs. 6 or 7 a day. I saw his work. The exact work could be done here by a man who gets about Rs. 40 or 50 a month.

Q. Then why send the men home?—*A.* The man here takes a long time. The other man adopts up-to-date methods.

Q. For practical purposes it would be very difficult to select an artisan and send him to England and educate him there. When he comes out here he will have to work on the same footing?—*A.* I have no idea of factories. I am speaking of cottage industries. For example the goldsmiths or carpenters in Madras who work in groups—father, sons, cousins, etc., in their own houses. If one of them is sent for training to foreign countries in the use of up-to-date tools and modern methods the industry will be benefited as he will join the group on his return.

Hon'ble Sir R. N. Mookerjee.—*Q.* That man as soon as he returns from England will not go to the cottage industry. He will want to be a gentleman?—*A.* If he becomes a gentleman the country need not be sorry for it. He may at the same time be a better workman.

Q. Has anything been done to revive the shipbuilding industry?—*A.* Yesterday I showed you some new boats being built at Beypore and Calicut.

Q. What sort of boats?—*A.* Country sailing boats carrying 200 to 300 tons.

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* *Vide* additional written evidence printed after oral evidence.

Sir F. H. Stewart.—*Q.* Has any attempt been [illegible] larger?—*A.* I heard that in Cochin and Coringa they were able to [illegible] larger size.

Q. How many tons?—*A.* Four hundred to 500 tons.

Q. Those things that we saw in the beach yesterday, how many tons can they hold?—*A.* About 250 or 300 tons.

Mr. A. Chatterton.—*Q.* You are the Assistant Director of Fisheries. Do you carry on the general administrative work of the department?—*A.* Under Sir Frederick Nicholson.

Q. Is there work going on in the east coast?—A. Mr. Hornell is doing a certain amount of work in connection with chank fisheries and pearl fisheries, as well as certain matters connected with the economic condition of the fishing folk and the divers.

Q. He is working at Tuticorin?—A. His jurisdiction comes as far as Tanjore and Chingleput.

Q. He is an expert in charge of the pearl and chank fisheries?—A. He was originally in Colombo.

Q. Is there nothing going on beyond Mr. Hornell's jurisdiction?—*A.* I have been visiting the Northern Circars coast and trying to do some co-operative and social work in Cocanada and Uppada.

Q. No experimental work has been tried?—*A.* No.

Q. Is anything going on in Madras in connection with fishing?—*A.* There is a proposal to send some of the west coast men and introduce their boats and nets in the east coast, specially in Madras Harbour where they will be able to do some good work.

Q. How far out do the fishermen go to sea at the present time?—*A.* Going about 12 or 15 miles. They must anyhow get back the same day.

Q. How far out do they commonly fish?—*A.* Mostly within two or three miles. At times when they follow some shoals and go in pursuit of it they go even 15 miles.

Q. This sardine fishing is very uncertain?—*A.* The movements of the shoals are very uncertain.

Q. Is there any record kept of the quantity of fish manure that has been manufactured during the last 30 or 40 years?—*A.* None except what you get in the trade returns.

Q. Is it true that only a comparatively small quantity goes to Japan?—*A.* The major portion is exported and some of it goes to Japan.

Q. The materials for fishing are constructed locally?—*A.* Boats and nets, yes.

Q. What materials do they use?—*A.* They use cotton as well as sunn hemp for making nets.

Q. Do they spin it themselves?—*A.* The fisher women do it with their fingers.

Q. What do they use for preserving the cotton?—*A.* They use a green leaf (*Clerodendron inerne*) and make a decoction of it by boiling and the nets are dipped in it.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* You say here that when duty free salt was introduced in fish-curing yards, it was taken advantage of by petty merchants belonging to other castes who started fish-curing on their own account?—*A.* Yes. That is so. Other people have come in largely now.

Q. Do they now form a larger proportion?—*A.* Yes. The fish-curing was mostly carried on by the fisher women. The women took hold of it as soon as the catches were landed and if it was a small quantity they sold it as fresh fish. If it was a large quantity, they cured it with the salt earth which they used to gather from the saline fields. For the larger kind of fish, they used the bazaar salt before the tax on salt was increased.

Q. Now you say curing has been taken up by other people?—*A.* Yes. When the fish-curing yards were established by Government, the fisher women would not go there because they were very timid to do so.

Q. Are they employing these people in the Madras Company?—*A.* That is only for fish-canning and does not require the services of a large number of women.

Q. Have you got a school for the fisher class? Is there only one?—*A.* Yes. A proposal is before Government for starting more schools.

Q. Do you think that with education they will improve?—*A.* Yes. We will be able to get from them a better hearing in matters relating to the improvement of their industry.

Q. If they know how to read, they could read books relating to fishing and learn things for themselves?—*A.* Yes.

Q. Speaking about the museums you say that the prices of the articles ought be mentioned. Don't you think that that is a very big order? Prices always change? *A.* Even now our prices are marked on the fishery products. We say that it varies much, say from 2¼ to 5 annas per lb., etc.

Q. What is the use of the prices given in this way? You say that you ha started temperance societies. For what classes have they been formed?—*A.* They a mostly for Hindus and Christians who are addicted to drink. In South Kanara v have a few temperance societies.

Q. Started by whom?—*A.* By a few of the leading men of the community und our guidance.

Mr. A. Chatterton.—*Q.* Have these societies any effect on them?—*A.* On New Year Day every year they take a vow before their shrine that they will abstain from drin in the course of that year.

Sir F. H. Stewart.—*Q.* Do they manage to keep it?—*A.* Yes. They tie a re string round their neck in token of having taken the vow.

Q. You say that there is a society which in addition to stopping drink has al undertaken the collection of sums of money which the members have saved by givir up drink and that this money is again given out to them. Don't you think that th might have a bad effect on them?—*A.* No. We want to get it registered as a co-oper tive society.

Q. That will be a slow process?—*A.* Yes.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Have you thought of giving these fisherme compulsory education?—*A.* I would not make it compulsory at this stage.

Q. Then you say that the Director of Industries should be a non-expert official? I you want him to be a member of the Indian Civil Service?—*A.* He should have admini trative experience whether he is a member of the Indian Civil Service or not.

Mr. A. Chatterton.—*Q.* Why do you think that an expert would not have admini trative experience?—*A.* If he has it, then by all means he can be employed.

Q. You say that there will be no difficulties in getting our boys into factories England? Do you know if they take them into factories?—*A.* I speak specially of o artisans. That is my humble opinion. So far as my enquiries in London and son other big cities go, I think the thing can be attempted successfully.

Sir F. H. Stewart.—*Q.* Is it only the sardine that is used for the fish manure? There are other kinds of fish also as well as fish offal and waste of which there is a lo

Q. Do you extract the oil from the sardine and leave the residue separate? Yes. That is according to the new method.

Q. Can you not make this manure from any sort of non-edible fish?—*A.* Such fis is not plentiful. There is a fish called mackerel. That is also converted into manu when it is very cheap.

Q. Do you get shoals along the East coast also?—*A.* Yes. On the Northern Circa coast, on the Gōdāvari, Cocanada and Waltair coast.

Sir D. J. Tata.—*Q.* Has there been any attempt to find occurrence of these shoal as to where they occur and when they occur?—*A.* The non-occurrence of these shoa near the Madras coast may be due to the fact that there are no large rivers in th Chingleput and Nellore districts. The idea is that rivers wash down to the sea so muc of food-stuff. Higher up at Masulipatam, these occur.

Q. The banks are also feeding places?—*A.* That has not been investigated.

Q. Has there been any attempt to find out the causes which affect the occurren of shoals?—*A.* No practical investigation has been made.

Mr. C. E. Low.—*Q.* Do the central banks finance the fishing co-operative societies?— *A.* We are not encouraging the fishing people to borrow. We want to make them fir to create their own capital by means of small monthly compulsory contributions.

Q. Have you any supplementary remarks to make?—*A.* There is another point tha I would like to bring to the notice of the Commission. We have got some very exper local blacksmiths. They make excellent knives. I might submit this knife for inspec tion. (Witness handed in a knife for inspection by the members). It costs about 1 annas. If they are trained according to modern methods in the use of improve tools and appliances, they will make it still better. The cheap knives that are brough into this country spoil this industry. I am in favour of preventing the importation o very cheap articles. There is the enamel ware for example. There is great economi waste. The average life of an enamel vessel is very short. The poor ryot out o ignorance buys it.

Additional Written Evidence.

(Submitted after oral examination.)

Rules regulating the working of fish-curing yards.

In Bombay.	In Madras.
1. Government pays for the cost of the site, buildings, fence, etc., when a yard is to be newly opened and pays all charges for maintaining them.	1. When a yard is to be newly opened Government acquires the site for it under the Land Acquisition Act and puts up the buildings, fence, etc., but all the charges for these are recovered from the curers by a cess levied on them, e.g., if the usual price of salt is only 10 annas per maund the curers have to pay 10 annas plus 2 annas cess till such time as whole of the amount invested by Government for constructing the yard is recouped. In fact the opening of a yard will be sanctioned only if the applicants guarantee that they will take a sufficient quantity of salt and thereby ensure that Government will not sustain any loss. This arrangement throws the burden of paying the cost of constructing the yard on those curers who resort to it when newly opened and the others who join it after the Government have recouped their original investment are free from payment of this cess.
2. Salt is issued for curing to any person who brings fish into the yard and there are no recognized ticket-holders.	2. Any one who wants duty-free salt has to become a registered ticket-holder of the yard and if he fails to carry on any curing operations for a period of six months his ticket will be cancelled and no more salt issued to him.
3. Salt is issued at a uniform price of 8 annas per maund.	3. The price varies in different localities from As. 6-8 to As. 10 per maund and when such variations occur in adjoining districts, e.g., Malabar As. 10 and South Kanara As. 6-8 the curers who have to pay the higher rates are at a great disadvantage in selling their cured fish.
4. The recognized ratio is a maximum of one maund of salt for every three maunds of fish, big or small, any excess that is left after the day's curing being delivered back to the yard officer for safe custody and return for future use.	4. The ratio varies considerably from 1: 5 to 1 : 10 for purely local methods of cure. The curers must use all the salt issued to them for a particular batch of fish and on no account keep any balance for future use.
5. Each consignment of fish is not required to be kept separate in the process of curing but several batches, even of different days, may be mixed up.	5. Each batch even of the same day should be kept separate till they are dried and removed from the yard.
6. Fish that is cured under the local system is retained in the yard only for a day, e.g., fish that is salted in the morning, noon or night is washed and passed out the next morning, and the fish is not dried before removal from the yard. In case the curer finds it impossible to remove the fish next day, he is allowed to keep it in the yard and if the quantity of salt already issued is found insufficient more salt will be issued for curing it.	6. All fish except those cured under the special Colombo and Ratnagiri methods must be fully dried and removed only on the third day. Hence moist cured fish which is much superior to the hard dried fish as regards nutritive properties cannot be cured in these yards. Moreover two or three days' detention in the yard is a hardship to the curer as he cannot dispose of the fish if there is a demand for it the very next day.
7. The subordinates (karkuns and peons) who are in charge of fish-curing yards are provided with quarters very near the yard and are always on the spot when the fish arrives.	7. The subordinates in charge of fish-curing yard on the West Coast where the curing operations are carried on on a very large scale are not provided with quarters and they live at some distance from the yard.

WITNESS NO. 249.

SIR FREDERICK NICHOLSON, K.C.I.E., *Honorary Director of Fisheries, Madras.*

WRITTEN EVIDENCE.

Financial aid.

Section I.—I assume, as question 5 seems to assume, that financial aid by Government is recognised as necessary in fostering new or developing old, stunted, or stationary industries in India. The method is so universal outside of Great Britain, or in Great Britain in former days and again under new ideas in recent days, that the point need not be laboured ; Ireland, Japan, Canada, Australia and Germany are all cases in point

As regards the particular method, I consider that no hard and fast rule can be laid down; each industry, and even each case, requires its own method of aid. As mentioned in Section X, it is a universal rule in Germany and Austria that all spending departments of Government shall purchase home products almost exclusively, and this has been highly beneficial, defects under local competition, were temporary, and competition led rapidly to perfection. Similarly in India, for many articles such as those of stationery, Government would best foster the concerned industries (1) by expert enquiry and experiment if necessary, e.g., in preparing and standardizing inks, gums, pencils, etc., (2) by contracting to purchase indigenous goods up to the required standard. Again, in some cases a grant-in-aid is the best method. Suppose an industry like that of distilling essential oils is considered not only possible but desirable and a reputable person of sufficient knowledge and serious intention proposes to make a preliminary experimental investigation; then for such matters as the purchase of experimental stills, the planting, preparation, or collection of raw materials, and the cost of experiment, a grant-in-aid would be a suitable form of assistance. For boats to be newly constructed for deep-sea fishery work or for supply of motors, etc., to such boats or for navigation especially coastwise, the tonnage bounty or mileage or line subsidy, is the general rule. For co-operative fishery yards Government loans either in cash or in the provision of premises, the loans to be recovered by annuities or in rental would be desirable. Hence I would say that all methods are in use and useful, and that the particular mode of financial assistance should depend entirely on the conditions.

I should add that in addition to the seven methods mentioned, there are other important methods, such as the relief of a nascent industry from income tax until it has taken a distinct position; it is not merely the impost itself but the fear or fact of mistaken assessment that operates; I can give actual facts. Moreover, the acquisition and grant of suitable land by Government would often be a great boon; to obtain a complete title to land under the Hindu or Muhammadan Law is a very difficult matter, and a factory might be very awkwardly placed for no fault of its own; in two industrial cases within my own knowledge litigation was constant for 19 years; in one case the land was bought at a civil court sale and after great improvements had been made, several heirs under Hindu law set up consecutive claims, and much loss was incurred both in litigation and by the prevention of further improvements. Since Government can under the Land Acquisition Act obtain and give a perfect title at once, a factory could be put up without fear of disturbance.

Government experts trained in Government factories and the data obtained in such factories should also be placed at the disposal of nascent industries; the whole large canning industry of Japan resulted from Government experiments in a factory of its own, and its manager was then lent to the first private factory started which was one which I happened to inspect. Another financial assistance is the admission of raw material, machinery, chemicals, etc., *free of duty*, at all events for a given period; as noted under Section X there is a strong precedent in the admission duty free of soda ash and other chemicals for weaving factories or mills.

Where Government financial assistance is given in any shape Government should have the right of inspecting and auditing the accounts and the conduct of operations, but in my opinion interference in the business is generally undesirable. Assistance in money or privileges should be given only after full enquiry and when Government is satisfied of the advisability, character, and prospects of the undertaking, and of the qualifications of the beneficiary; when this has been satisfactorily settled there should be as little interference as possible outside of ascertaining that the money is being spent as intended. Rather than take part in private factories Government must take certain risks, which, however, will be small if the whole matter has been thoroughly considered beforehand.

Pioneer factories.

I am however in favour of Government pioneer factories in many cases as the best form of assistance, i.e., that Government instead of financing a proposed enterprise by loans or other grants, should take upon itself the risk and cost of experimental enquiries. This appears to me necessary where the proposed industry, however desirable is complicated or demands such technical and business knowledge that it would in this country remain untouched if Government will not start it. I may mention the cannery and the soap works now under me; a cannery involves much technical knowledge both of fish, of bacteriology, of cookery, of mechanical plant and methods, and of markets and public tastes, and, in India, there is the uncertainty of the new products being suitable to the demand actual or potential. Hence—and because fishery matters were never even considered by capitalists—canning was utterly untouched in this Presidency except by a French canner at Mahé; this exception gives point to the need for a Government pioneer factory, for the secrecy maintained in the French factory prevented any chance of imitation by outsiders.

So also as regards soap; in fact, without a soap boiling expert it would be impossible to start the business, and soap boiling can only be learnt in a factory, unless, at considerable expenditure of time and money, men—whether Government servants or not—deliberately start to learn the work *de novo* by experiment and failure. No private person—Indian at all events—would do this, and the soap industry, especially in view of commercial uncertainties, would have remained untouched but for Government effort. If the hardening of oils, the manufacture of paints and varnishes, and other industries depending on applied chemistry are to be rapidly developed, then, although highly desirable and very feasible, they will unless taken up by great capitalists who can command the services of experts, etc., require to be started under direct Government auspices, whether in the first place at a technological branch of the Research Institute, or otherwise.

It appears to me a mistake to suppose that Government pioneer factories should necessarily be closed or handed over to private enterprise as soon as they have " made their proofs ". Technical and even commercial success are not the only *raisons d'être* of such factories, but the training up of experts from managers to artisans, of instructors, and perhaps inspectors ; moreover in many cases a pioneer factory is a place of industrial research and development in that particular industry. E.g. Government could sell its cannery tomorrow (I have had offers) but it would lose its main value not merely as a continual object lesson but as a place of instruction and experiment. Canning, though feasible for many years, did not develop because there was no one to spread the knowledge of the " secrets of canning " especially under Indian conditions ; these had all to be ferreted out by the experimental work of the factory, and if it were now handed over to a private firm the experience gained would remain secret, and development again be arrested. It is my duty now to train a series of men who will be capable of taking up the work (two from Baroda and one from Travancore have studied under me) as experts; moreover I have to train canning foremen; maistries, solderers, packers, etc., and on the mechanical side, tinsmiths, and mechanics who can work delicate machines for making " sanitary " (solderless) cans. Moreover, experiment is continuous and we are incessantly finding out new difficulties, new methods, new recipes. Again, when canning factories are privately started there will have to be trained Government inspectors with rights of examining canneries, for of all industries this requires absolute cleanliness and honesty. When I say that certain cheap canned foreign goods which I will not here specify, are notoriously and, by the price, necessarily adulterated to an incredible degree, I am merely saying not only what is notorious but what was deliberately stated to me by canners out of India, and by recipes privately supplied to me, while in the more serious matter of preventing the packing of tainted fish, and the re-processing of blown (decomposed) tins, etc., regulative inspection will certainly be necessary.

So also in soap-making; it is necessarily, to be a place of instruction where small folk can learn the soap " mystery " and give this Presidency a larger chance of successful competition with the great Western trusts; it is probably or at least possibly the small man, smaller even than in Germany and Austria working in a tiny factory with petty plant (e.g., a one ton pan or even the cold process alone) with his own labour and supervision, serving a small area, buying small parcels and turning over his petty capital *very rapidly*, and sending his glycerine to a central refinery (at first in the Government factory) who will do much for the industry. The Government soap factory will have work for many years in experimenting on various soaps, on methods of glycerine recovery for small folk, on cheap plant for all the processes including toilet soap. Hence, even if the next year or two proves technical and commercial success I should ask for its continuance as a place of industrial research and instruction.

On these analogies, I would say that the closing or handing over of a Government pioneer factory should, in each case, depend on conditions local or individual to the industry and that no hard and fast rule can be laid down. That was the rule adopted, I believe, in the great cinchona industry started and developed by Government also in the aluminium industry, viz., the relinquishment of the business when Government intervention or instruction *was no longer* required. In the more complicated industries such as those of applied chemistry, such relinquishment may be and would be deferred far longer than in simple mechanical industries.

Financing agencies.

Regarding difficulties in financing I can—outside of agriculture—only speak from my knowledge of the fishery industry ; the financing of this backward undeveloped industry is deplorable, even worse than that of the small peasant, for he has less tangible property as security, and his habits, conditions of life and industry, etc., are not conducive to thrift. The matter is very special and will be dealt with in detail during the next few years by the Fishery Department; Fishery Bulletin No. IX gives some description of methods and hardships, but it would take long to give any idea of the various hardships of the fisher-folk. As a special department of Government continuous in operations and system, is in charge of such problems, the financing of the fisher-folk may probably be left to that department to do what is possible by a carefully considered industrial loan system, by the promotion of co-operation, by the inculcation of thrift and temperance, and by education; these matters are all in the first stage of experiment. Co-operation is especially desirable amongst these folk whether as fishermen or curers, and a beginning has actually been made. The Assistant Director, Mr. V. Govindan, will specially mention this matter.

Limits of Government assistance.

On question 14 I beg to record my strong opinion that in the matter of Indian industries we are bound to consider Indian interests firstly, secondly and thirdly; the more so that, essential as it is nationally to have agriculture and industries develop side by side, it may be found almost impossible in the face of the great industries and trusts or combines of Europe and America; as elsewhere stated, even fair competition may ruin an incipient industry; much more if the competition be that of goods, perhaps gravely adulterated to start with, and dumped at below cost price in India for the deliberate purpose of preventing or crushing Indian enterprise, E.g. suppose soaps made by a combine at 5,000 tons per week; the combine could dump soap on the Indian market at impossible rates and merely write off the loss against their huge other profits; this would ruin the potential soap industry however intrinsically suitable to the country and its conditions. Hence I would say that no rules should be laid down limiting Government aid to desirable nascent industries, but that such aid should be opportunist and be applied to any necessary extent on any necessary occasion, provided only that Government has decided, on mature expert investigation, that the industry ought to become naturalized in India.

Technical aid

Section II.—The Government Fisheries yard at Tanur is experimental and demonstrational, and a proposal is now before Government to take over the 120 so-called Government fish-curing yards. If taken over by Fisheries these yards will be gradually worked as demonstration curing yards, and thus reach the ordinary curers which is not the case at present.

The Government fish-oil and guano branch of the Tanur yard is also a demonstration factory and it is hoped that the 250 small factories which have come into being since 1908 as the result of Government propaganda and example, will now develop their methods on the improved lines since adopted by the department.

Surveys for industrial purposes

On questions 25 to 27 regarding further industrial survey I consider that future surveys should be individual and not general. I suppose that the Department of Industries working in communication with those of agriculture and forests, and provided with reference books and general reports, with various monographs and district manuals, and aided by the museums and collections, etc., is now in a position to record and tabulate in a general way all the resources of raw material, all the indigenous village industries and their condition, and all the general conditions which give promise of development either of the old or of new industries.

Much more however is needed for the information of capital or of any one contemplating industrial operations in any specific industry which exists but is stunted or stationary, or which gives any reasonable promise of success. For instance, the manufacture of bangle glass and bangles was common a few years ago but has been ousted, mainly it would seem, by Austrian glass. Suppose the revival of this industry, coupled with a great development in form and ornamentation, and with subsidiary lines such as glass buttons, is desirable, then the survey should, for example, examine the exact localities of the old industry, and the reasons for such position, usually the presence of certain fusible earths; the local reasons for decay or stationariness of the industry such as want or cost of fuel, restrictions or imposts on the digging of the earths, foreign imports, etc.; the character, composition, and treatment of the raw materials, the character of the kilns and crucibles, the temperature, fuel and time required (temperature is very low and the crucibles are those made by brass founders by elutriating red earth); the composition of the glass and its characteristics such as ductility, fusibility, softness, working temperature, natural and artificial colour ; the cost of the glass mass; the methods of working it into bangles; the present existence or otherwise of the professional class who work the glass, their training, pay or profits, conditions of labour, independence or subservience to money lenders or wholesale merchants, the business conditions of their trade and so on ; finally a statement of probable improvements, the need for financial or expert aid, etc. With such a report before him coupled with a correlated report on the imported articles, the Director of Industries would be in a position to say what could, if anything, be done. I mention this because I have seen reports in which the general survey missed the main business points; the Punalur paper mill of 20 to 30 years ago would probably not have been started on an "eta" basis had there been a proper preliminary survey including, as one item, the capacity or incapacity of the "eta" in the matter of bleaching; a report regarding bamboo fibre mentions its excellence and gives details for its treatment but fails to mention the areas on which the bamboo was found, whether in narrow scattered zones or patches or large continuous blocks, whether ready and cheap transport was feasible, whether the tract was—as bamboo tracts often are—feverish and unhealthy to a prohibitive degree; it is not merely the suitability of bamboo for paper making that required study but its accessibility.

Similarly with regard to oils; it is necessary to know far more than we do even about the mere manufacture and treatment of oils. Take for instance the single question of adulteration; we know in a general way that they are adulterated—the higher classes with the lower, and so on—but I doubt if the precise adulterations and the places or stages in which there is adulteration, are known. Again, the following is an actual recent case ; a certain oil was shipped home as edible oil for edible purposes ; it was on reaching home, found to be too rancid for edible purposes and was only saleable as cheap soap stock; similar oils have been obtained and are found to contain, even before export, so large a percentage of free fatty acids and of impurities (water, etc.) that at least 15 per cent will be lost in refining it plus the cost of so doing; the percentage would have considerably increased during the hot voyage home. Now this oil was provided by brokers who purchased from the village oilmen; what are the conditions of the oil manufacture and trade up to the exporter, which lead to such conditions and losses that absolutely *bar* such country-made oils from export as high-priced edible oils? A detailed survey of the oil industry in particular would tell us the above facts and indicate remedies.

But there are of course numerous other lines of detailed enquiry necessary for the information of persons contemplating the establishment of an oil pressing industry coupled with the industries necessarily linked with it, such as soap, candle, and glycerine manufacture and that of edible products for men and cattle, none of which allied industries can be negelected by a firm intending to deal largely in oil extraction, since the products of such oil extraction business would mostly have to find a market in India or in countries which have no tariff wall against oils and oil products ; the greater the output of oil the greater the necessity for the allied industries.

It would be easy to fill many pages of queries necessarily preliminary to any establishment of the oil and fat industries, and which should therefore be collected and made available *in advance* by the Department of Industries in order at least to induce consideration by capitalists; it is because there is no such information that capitalists, unwilling or unable to make detailed enquiries for themselves, or perhaps merely ignorant of possibilities or even unaware that any opening is available for enterprise, simply pass by on the other side. In the matter of canning for instance; the mere idea had, seemingly, not occurred to any one and in any case no information of a technical or business character was available; on the matter being introduced to the consideration of firms in England, it was at once considered a matter of interest, and one firm issued to me a long list of questions on all aspects of the business avowedly as a mere preliminary to considering the advisability of sending out an expert for still more detailed enquiry. Similarly in the case of oils, a report in general detail, as similar preliminary was asked from me by a great British firm who proposed to manufacture certain goods, and who desired to have a basis for further enquiry. Under Section X item (5) I have now proposed complete enquiry by a practical expert. Hence there should be reports, of the most detailed nature drawn up each by a practical expert on the statistical, industrial and commercial side ready to hand in advance for enquiries, in regard to all industries which are reasonably possible in the country ; still more for those of real promise such as the oil and fat industries. It is to stimulate attention and to encourage further enquiry by capitalists that such reports should be made, and they should be framed with that view.

Private enterprise can do infinitely more and better than Government, and the main idea of a Department of Industries should be to stimulate and assist such enterprise whether of the capitalist or co-operative goup.

Commercial museums, sales agencies, exhibitions.

Q. 29, Section III.—I consider that " commercial museums " are essential to industrial enterprise. But the name here given is an insufficient description of their proper rôle, which is correctly indicated by the German title of ' Industrial and Commercial Museum and Exhibition (or collection) of samples " ; I append extracts from personal experience of one of the best and earliest of these, viz., at Stutgart.

When I first visited the Museum it was a modest collection badly housed in old barracks; on a subsequent visit it was magnificently housed and organised by reason of its importance and success even in its early days, and it was possible, even for a stranger, to examine every product of the country and ascertain in a moment where each product was made. The institution was double sided, viz. :—

(1) an exhibition of products, plant, etc., from foreign countries, intended for local limitation, etc.

(2) a collection of samples of every class of local industry with every facility for tracing the places of manufacture.

(1) The original idea was to provide the home industries with a collection showing the superior materials, implements, methods, and products of foreign countries, so as to stimulate better home manufacture. Advantage was taken of various exhibitions, practically beginning with that of Hyde Park in 1851, to make useful collections relating to the home industries which at that time were both scanty and in low condition, Württemberg at that time being mainly a poor agricultural State. This at once developed into a standing exhibition in which home and foreign products were shown side by side in view to comparison; this obviously had also the advantage of displaying to foreign visitors and purchasers the products manufactured in the State, and the Museum therefore did double duty almost from the beginning.

The idea once started, rapidly developed; soon after 1850 the Museum made collections of improved tools used abroad for every industry which was to be found in Württemberg, especially those used in the small industries and workshops; especial care was taken to demonstrate taste, solidity, and accuracy in workmanship, and sets of technical and decorative designs and models were also provided. Early results were seen in the manufacture of improved weaving plant, pianos, locksmiths' work, iron and other metal goods, toys, etc.

The Museum had now become a permanent exhibition of home and foreign products and methods and plant in all classes of industry to be found in Württemberg, and it was continually enriched by purchases and gifts both of machines and goods, largely from the great International Exhibitions; and progress was specially indicated by the exhibition side by side of old and of improved methods, plant and products.

The Museum seemed singularly free from red-tape. Admittance was of course free, and an Inspector in every room enabled a visitor to inspect, handle, and measure, etc., any items which he wished to examine thoroughly; manufacturers were permitted to borrow for three weeks any object useful in their business; and a "Suggestion book" was provided in which any visitor could suggest the procuring of further samples or objects; in this way the public was taught how to use the collections to best advantage. Moreover the authorities permit a complete trade collection to be exhibited in charge of an expert at a manufacturing centre, on sufficient demand being made.

The catalogues were, of course, most detailed and accurate. Everything was entered according to the division (12 in number) in which it appeared; and the explanatory remarks were so full that the catalogue assumed the character of a general technological work. This was specially the case in industries such as cement, pottery and earthenware glassware, iron and steel goods and metallurgy in general, weapons, the manufacture of locks, rope making (hemp and wire) lacquer and varnishes, tanning, weaving, knitting, paper, etc., the nature of the raw materials used their places of production, etc., being also given. The stages of development from crudity to perfection in each industry were expressly shown, and even the several steps in manufacture, so that the show provided object lessons in practical industry, very useful to those who, working an industry in its lower stages, desired to improve their methods and products.

Machines and tools suitable to the several industries as well as tool-making machinery were liberally provided, and were shown in motion usually on market days; these also were freely lent out for experimental trial. Models to scale were provided where machines were not shown.

A very remarkable part of the collection is found under textiles and clothing. For many years the best samples and designs were obtained from every important quarter of the world and stored in many hundreds of volumes to which free access was given; moreover, weavers were permitted on the arrival of new samples not only to inspect such samples but to cut off portions for study and copying.

(2) The permanent exhibition of Württemberg products formed the second side of the "Musterlager". This consisted of samples sent in by all local manufacturers, and not only were these exhibited and catalogued but maps were made showing the chief localities of manufacture (e.g., the art linen products) and the addresses of all manufacturers.

Hence on this side the purchaser could see at a glance every kind of product in which he was interested, its character, price, place of manufacture, and addresses of the various manufacturing firms. Finally it may be added that the institution formed an enquiry office for the information and guidance of persons interested. At the time of my visits I was not specially interested in industrial work outside of agriculture, but even to a casual visitor the ease with which an enquirer, whether local manufacturer or foreign purchaser or seller, could obtain information as to products, methods, plant, markets, etc., was obvious and remained with me as a perhaps useful memory. It is hardly necessary to add that a splendid technical library forms part of the Institution.

In Japan Year book for 1916 it is stated that by 1913 the Tokyo Commercial Museum, which was evidently founded on the Stuttgart model, had already 65,789 samples of which about 5,000 were foreign. When I saw it in 1906, the number of samples was only just over 20,000. The description in the Year book mentions the use made of this Museum and of other provincial ones. As a matter of fact, including the museums for special localities and industries, there are very many in Japan as recorded in my published notes on Fisheries and Agriculture.

The several commercial museums keep up an active correspondence with the Japanese consulates and commercial attachés in foreign countries as well as with the foreign consulates, etc., in Japan, and with similar museums, business corporations (e.g., Chambers of Commerce) and manufacturing firms both in Japan and abroad. Hence it is not a mere standing quiescent or static show but an active propagandist body, intermediary between the manufactures and buyers of Japan on the one side, and on the other of the manufacturers and buyers of other countries.

But the Japanese have also developed what I have suggested under " lace making ", (section X *infra*) viz., museums or agencies in foreign countries both for the exhibition and sale of these goods; this is being done for Irish industries at this day, as begun many years ago by Mrs. Ernest Hart. These foreign collections contain numerous samples of Japanese goods with all necessary information about them. There are a number of them in various countries, usually under control of the Japanese Consuls, but housed with some firm; these are Government official agencies but there are also private collections which receive State aid. They are mostly in the Far East, especially China.

It need hardly be remarked that the Japanese have taken full advantage of foreign exhibitions for the display of their goods (and for learning lessons from other nations) and it is recorded that at the recent Panama Exhibition they obtained 1,511 prizes including 343 gold medals and 178 grand and special distinctions; this was a notable advertisement of Japanese goods and a vast stimulus to its industries: the cost to the Japanese Government was nearly Rs. 2 lakhs.

It appears to me that a standing exhibition—for such it is—of the above nature should be formed in the Headquarter city of every Presidency or Province. The recent (1915) temporary exhibition of industries in Madras was fruitful of results so far as regards a momentary awakening of the public to the products of the country, but what is wanted is a standing organization on business principles, founded and maintained and utilised by business men and manufacturers. May I illustrate from say, soap, supposing its local manufacture to be considered in every way desirable. On the one side I would place models of foreign (non-Indian) soap making plant, including glycerine recovery, for given units of production, e.g., 10, 50, etc., tons per week, with makers' catalogues and with pro formâ invoices and notes showing the classes and prices of plant required for given classes of product. Side by side with these I would place samples of all the raw materials used in foreign soaps with their sources of origin and current prices, and over against these should be priced specimens of the soaps, glycerine, etc., made by such plant and from such materials, whether abroad or in any local factory, Government or private, and lists of the foreign soaps found most in demand in this country. I would also point out in the technological notes the methods—not in detail but in general character—of soap-making and the special characteristics of each class of product with their several advantages and disadvantages ; stress being also laid on the fact that soaps at unduly low prices are necessarily adulterated and are usually far from being really cheap. On the other side I would place samples and current prices of all the raw materials available in the Presidency together with the main localities of production, and priced samples of all imported necessaries—caustic, carbonate, silicate, perfumes, colours, etc.—together with addresses of suppliers of all classes of material. Local methods of soap-making would be described by model and note, and their shortcomings and advantages mentioned. Notes from the Government factory would be appended giving such data as advisable centres of manufacture, dangers to be avoided such as hard water, distance from supply and market, etc., markets or uses for glycerine, etc.; also tables of cost and commercial data showing the classes of local soap found most in demand (e.g., soaps free from animal fats, etc.), the localities or classes demanding them lists of dealers in soap, railway rates, and special facilities or disabilities, etc. To this would be added the addresses of all existing soap works and of their special products with business samples, so that buyers may be as well informed as manufacturers, and also that suppliers of raw materials may ascertain their customers and their probable wants. Many other items of information will occur as necessary when putting up a show for soap in a permanent industrial collection intended for practical instruction.

For a cannery there are similarly a long series of exhibits, recipes, processes and data for canning and for can-making or tin-plate working plant which would be necessary to assist would-be manufacturers.

Take the case of bicycles; the exhibits would display separately every part of the several classes of bicycles with precise and standardized measurements; under " materials " would be found the classes or grades of steel mostly in use in the several grades of machine; the tools and machines required for machining and fitting the several parts and for use with the machines; the materials necessary for plating; the enamels, paints and varnishes required ; the varieties of types, etc. Under " methods and plant " would be indicated the processes for plating and enamelling, with specimens or models of the plating baths, enamelling and drying stoves for use with ordinary fuel, liquid fuel or kerosine, gas, or superheated steam methods and plant for vulcanizing; the preparation of repair outfits with recipes for the rubber solutions. Under addresses would be found the manufacturers of the several classes of steel or of special parts such as chains tyres, etc., of enamels, paints and varnishes, of solution tubes and tin boxes for repair outfits, of plating and stoving plant, of agents and sellers of finished machines.

These suggestions seem obvious but are not in present use in this country, whereas elsewhere, whether in the country of their origin (Germany) or of adoption such as Japan, they are considered essential and in Württemberg it is a matter of common history that the "Musterlager" was a powerful instrument in the work of the central organization for Industries which, within the period of my own observation, has transformed that small agricultural State into one of developed agriculture and advanced industry.

I advocate, then, this standing industrial and commercial exhibition, and would take care that a small staff, well acquainted with the general subject and the contents of the exhibition, should be always on hand to point out, explain, and assist enquiries, to show invoices and statistics and to indicate books for reference and study. The Patent office printed records and specifications now maintained in Madras should form part of the attached library, which itself might be very usefully organized like the Patent office library in London which is of extraordinary value to enquirers ; I have always found it full of searchers, and all the several sections of the library, where most technical books and periodicals are to be found as well as abstracts of all patent specifications and the complete specifications for many years, are all open and free for consultation. I would add the power of borrowing books on proper conditions, for a very great hindrance to technical work in this Presidency, is the inability of men to obtain any knowledge of what is going on in the technological world, or to consult text books, or learn the contents, etc. of patents, and it is often impossible for men living and working up-country to visit Madras for study. Personally I have had to borrow from the Presidency College, etc., by the courtesy of the authorities, various expensive works on applied chemistry, etc. or to form a special library of my own. The above answers queries 78 and 79.

Reverting to exhibitions (queries 31 to 33) I conceive that the standing exhibition or industrial museum above suggested, might and should be popularized by occasional special displays (as in December-January 1915-16); it is advisable to interest and inform the general public as well as the special industrial and commercial classes; to advertise to the public the productions and industries of the country and even to remind business men and manufacturers of the facts of the country and the facilities obtainable at the museum.

On the question in query 33 as to bringing buyers and sellers into contact it is obvious that such a museum as I have indicated is primarily a business museum intended almost solely for buyers, sellers, and manufacturers, and that it provides the necessary information for the coming together of these classes.

Government patronage.

It would (query 37) add to the importance and usefulness of these standing exhibitions if the several articles in ordinary use by Government Departments were permanently exhibited together with lists of the several quantities, qualities, and prices; e.g., in stationery such items as inks and ink bottles, sealing wax, pens (including fountain pens) pencils and penknives, tapes and twine, gums and adhesives, erasers, rubber stamps, duplicators, locks and padlocks. In India we have every facility for making all the above cheaply and of fine quality, but they are generally imported, and when made locally such as inks (from imported ink powders) gum (crude from the acacias, etc.), sealing wax which will not readily melt and must be used extravagantly, are usually bad.

There should also be small museums at other important centres, organized in regard to any industries existing or highly probable in or in the vicinity of such centres; e.g., in Madura complete weaving and dyeing collections; also lace making and art needle work, metal work including electroplating, wood carving, toys, locks, oils and soaps, clocks and watches and articles of bijouterie suitable for indigenous and tourist consumption whether in metal, wood, ivory, chank shell, etc. The special collection, coupled with direct instructional effort, for the art linen industry at the museum in Württemberg, had an immense effect on the crude indigenous linen industry of that State ; this was expressly mentioned to me on the spot, and may be found recorded in the invaluable Irish Recess Committee's Report of 1896. Similar collections, varied according to the entourage, would be formed at other centres. But in all cases these should be linked with active instructional and propagandist effort ; otherwise they will be mere limbos.

As regards the purchase of stores in general I consider that with a properly organized Department of Industries all indents for ordinary stores and plant should be dealt with by the Director and not by the Stores Department of the India Office. The Director on the spot, with full knowledge of the precise articles required and the possibility of obtaining many of them in the country, would be in a position to buy locally everything that could be so procured and would thus stimulate very greatly local production and improvements; he would also know better than the India Office and could obtain more quickly the precise classes of machines, goods, etc., required for particular demands. Hence I consider that larger powers of purchase whether for Government Departments or on behalf of clients such as ryots, small industrials, etc., should be vested in the Director of Industries.

Training of labour and supervision.

Section V.—The matter of first necessity is the complete training of real "expert" managers (question 51), and the place for training is the factory; technical schools and institutes are aids to training but they are not the training itself. In Great Britain I find three successful methods; (1) the old and very successful method, usually in a manufacturing firm or family proceeding from father to son, where the sons get a good general education, e.g., at a public school, and then at 18 or so, take up the hereditary work; in this case they are compelled to go through the works in every branch as common workmen for several years; I have seen many young public-school men, who, doffing their society clothes and surroundings at the factory door, worked for years as ordinary artisans; e.g., in tanneries I have seen them go right through the yard from the fleshing and hairing blocks to the finishing of the butts in the lofts; or in railway workshops I have known them serve as apprentices on ordinary pay and under ordinary conditions and go gradually through the fitting shops to the footplate of the engines they have helped to fit; so in foundries, paper-mills, potteries. The business side is not omitted, and office training, buying and selling, and book-keeping are equally attended to, though this is very often more specially developed in particular members of the firm or family.

(2) But during centuries of industrial work, a very large class of technical foremen of extraordinary technical skill have developed in the several factories, so that members of firms are not *compelled* to be, as they were formerly, complete masters of and instructors in every working detail; moreover in the stress of competition industries are no longer comparatively stationary but of enormous and rapid competitive development both technologically and commercially, so that masters of industries can no longer spend their days over details, but must be trained in the science underlying their industries and in the methods adopted by their competitors and in the art now called "business efficiency". Hence there has arisen a new type of master, who on the foundation of a good general education, usually with some grounding in science, proceeds to a technological school (e.g., "City Guilds" at Kensington) and takes a three or four year course in applied science with such workshop and business training as the Institute can give. Thence, because this training does not make a man a manager, the scientific course has to be supplemented by a long course of detailed factory work in the selected industry which his special training has more or less fitted him to comprehend and consequently to develop.

(3) There is a third method provided for those of the artisan and foremen class who desire to better themselves and become foremen and managers, viz., the technological courses (e.g., at Finsbury College) given to young men already serving in industrial works, but this seldom leads to the highest grades unless the student is one who would probably have otherwise risen by sheer ability and capacity.

Applying this to Indian conditions; practically there are no continuous industrial firms of any size or industrial importance individually, outside of the textile industries, engineering firms, railways, perhaps some leather and chemical works and small tanneries, and consequently in training our men for any desirable industries we are compelled, if private enterprise is lacking (*a*) to start factories under Government auspices or stimulation (not *necessarily* direct management) where men can be technically trained, (*b*) to find technological schools or institutes where young men can begin their technical training, (*c*) to send young men home for the necessary training. Method (*a*) is all right and has the advantages over (*c*) firstly that the industry is thereby locally started, secondly that numerous men can be simultaneously trained; this is an essential object in the Government Cannery and soap works; in "assisted" factories it should be a condition of assistance that men should be trained, even though such men are being trained as probable competitors. Method (*b*) can never be more than preparatory, and one cardinal error in Indian ideas is that Institutes can provide experts who can at once establish or manage the industries in which they have received this preliminary training, whereas it is only after long and detailed work in a *going factory*, both on the technical and business sides, that such men can take their place as experts and managers: the technological institute is no royal road to expertism as men fondly hope. Moreover as industrial history shows, the technological institute mostly follows and does not precede industries. These are mere platitudes, but are not so understood in India, where young men are thought to be industrial experts because of certain diplomas, whereas they are only competent to understand their respective industries. Moreover the business side of training should be more efficient than at present. As for method (*c*) it is slow and there are grave risks in that the wrong man may be chosen which would delay or endanger matters for years, or that they get insufficient opportunity at home, or do not use their opportunities. I have however been favourably impressed by the one trained expert I have known in so far as his zeal and industrial knowledge are concerned.

On the whole, then, I consider that the best way both for starting selected industries in India and for training the future managers is, after the fashion of Germany and Japan and other countries, for the promoters, whether Government or private, to draw liberally on Great Britain, etc., for real experts as first managers of any projected industries; then to select young men, preferably men already trained in technological institutions, and to put them through close, disciplined, industrial and business training under these experts till they are fitted either to start on their account or as reliable business managers to capitalists. I do not, however, object—on the contrary—to men being sent home or elsewhere for study if carefully selected and sent for very definite purposes and provided with proper opportunities; but they should be men who have already worked at their specific industries.

Under such men, viz., the original experts and their disciples, there will gradually grow up the body of artisans who, at first drilled by mere rule into expertness will, in a properly run factory, gradually develop an intelligent understanding of and attention to works.

Such students as are sent abroad to study should be placed more or less under control of the local authorities who should also be concerned to obtain for them every facility. The students should report periodically on what they are doing, but—especially if they are young men who have already had experience in the specific industry—they should act as junior commercial agents, and report any facts bearing on that industry in its technical or commercial aspects, especially in comparison with the conditions and facts of the Indian industry if such exists. These students' reports, added to the reports ordinarily prepared by an Industrial Department, should greatly assist enterprise.

I may add that in Japan these student commercial agents are numerous, several hundreds having been sent abroad and trained; they are mostly young men recommended by business firms or others who know exactly what is needed.

Official organisation.

Section VI.—On the future organization of a Department of Industries I would refer to the evidence available in the papers which led or relate to the new Irish Department of Industries, including especially the Recess Committee's report on European Departments and methods and the reports about and emanating from Japan on the work of their Central Department. The combination of effort by Government and people, especially with the people organized into companies, associations, and chambers, as described by Sir Horace Plunkett on the one side or by recent works, since 1900 on or from Japan on the other, is the idea which it seems desirable to follow. It is true that the Irish Department has apparently failed to work out that fondly expected dual action, viz., of Government with the group of Industrial associations founded by Sir H. Plunkett and others, but such failure is probably temporary and incidental and not essential, and it is far otherwise in Japan, where Sir H. Plunkett's ideal, originated in Europe and hoped for in Ireland, seems to have developed in an amazing degree into business fact; the Japanese seem singularly to have combined the functions of a Central Bureau (a section of the Department of Commerce and Industry) with those of local bodies whether official district administrations (prefectures) or business associations of business men and manufacturers. The associations of Japan—as mentioned in my Notes on Japanese Fisheries and Agriculture, and in various year books or descriptive writings—are extraordinarily numerous, well developed, and active, and depend not on the fiat of Government but on the natural bent of the people who, in general, are absolutely fascinated by the craving to develop industry and trade and material wealth.

Apparently the Japanese Council (for Economic Investigation) consists of 70 members selected from Parliament, business firms, manufacturers, official and educationists. In Ireland the representation of the people on the Department of Industries is still larger and is made up of representatives elected by every county, and half as many Government nominees; altogether about 168. The power of the purse and all executive work rest with the executive of the Bureau, but as the Council has a veto, it can largely control expenditure.

It appears to me that in this Presidency we might adopt a similar constitution, viz., a Commissioner or Director of Industries, responsible direct to Government and charged with the administration of the Department, including of course the initiation and conduct of all industrial surveys and enquiries, of all direct effort in the way of pioneer or demonstration factories, commercial museums or other propagandist or stimulative effort, the advising of Government as regards the employment of experts and the despatch of students abroad, the collection of industrial, commercial and economic data, and all the other activities of a modern Department of Industries. It is better that executive functions should be exercised by an individual—of the right calibre—than by a body.

But an advisory council is a *sine quâ non*: I consider that a large Board representing Chambers of Commerce and Trades Associations, business men, manufacturers, district officers (selected for special reasons or knowledge) members of the Legislative Council, planters and others known to be interested in the development of industries, is essential. Hitherto the public has not been taken into confidence or rather into partnership with Government effort, nor has there been, outside of Madras, any recognized standing public body with whom industrial propagandism or even interest, still less activity, has been a specific function. The annual Industrial Conferences are good but spasmodic annual effort chiefly confined to papers more or less practical, is only a minor and almost negligible method of work. We want to interest the best thought of the country in the subject and to interest it continuously and in practical movement. This body would not be a mere consultative body but it would be the eyes and ears and tongue of the department, for nothing in the districts—whether industrial, agricultural, or economic—could escape the notice of its members, if worth calling members, who would, on the one side communicate with the Director, and on the other with the industrials. E.g. members in Anantapur would ascertain and report the condition, etc., of the bangle glass industry or of the local paper making from old well-ropes and other fibre, or of the chances of fibre cultivation or that of tanning barks and pods; in another district it would be toys, or lacquers, or grass weaving, in another of pottery, etc.; such reports would give the Director a starting point for closer and perhaps expert investigation. Moreover, as a consultative body meeting perhaps once in a quarter, the Director would have an assistance at present unavailed of, for the deliberations of a general body are wider and better threshed out than mere individual consultations, and there would be less chance of the grinding of particular axes. Again, even though solely invested with executive functions and the power of decision a Director would hesitate to embark on a scheme which was decidedly objected to by a strong and representative Advisory Board. Moreover, with a well selected Board, the Director would constantly be in consultation with individual members or industries in need of assistance or suggestion.

As regards the Director, I consider it impossible to state as a principle (question 60) the class to which he should belong; it is the man not the class that should be selected; a permanent official might at one time be the best all-round man with a large knowledge of the country, of the people, of the industries existing and possible, of its economic conditions, and of the chief business men; at another time the best officer might have to be selected from what is called the " business " world. It is doubtful what is here meant by a " business " man; no man who has not business instincts and perceptions should be appointed, but if by business man is meant one engaged in merchandise or trade he may in no way be the better man, and may indeed be far more narrow or inclined to small views, and less widely and sympathetically trained or inclined than the trained general duty official. It is a question of *personal* suitability.

Certificates of quality. Adulteration.

Section IX.—Personally I am not aware of many products in this country which need or could at present be brought under a practical system of Government certificates other than those which have frequently been commented on viz., indigo, beeswax, oils, butter and ghee, and one which has never been mentioned, viz., soap ; probably business men know of many others, such as honey which is innocent of honey, ginger which is rhubarb, and so on.

Oils are notoriously adulterated, each grade being liable to the admixture of lower priced oils; this is a matter of importance even in soap making; much more in the case of edible oils and fats. Mr. Tressler stated as Director of Industries that " adulteration (of oils) is almost universal and this is one of the things that has killed the export trade " (Note for the Madras Exhibition).

Butter is frequently mixed with animal fats, and possibly with mineral waxes such as paraffin, partly to cheapen it, partly to give it consistency in hot weather; it is impossible that butter can be pure—or digestible—if it is a thoroughly solid fat at 100°F. The matter is of serious importance since animal fat may be of a deleterious nature and may not have been refined or even sterilised—as is completely done in the case of margarine—, so that it may contain bacteria or their metabolic products of a deadly character, while such " butter " would be very objectionable to certain castes or classes.

Ghee is perhaps more adulterated than any edible product in the country; this is a matter of notoriety and has never been more scathingly criticised than in a recent number of the " Indian Trade Journal " where it was pointed out—in an extract—that ghee contains all sorts of adulterations, and that some ghee contained no true ghee at all. Modern adulterations are said to include mineral oils, such as " white oils " now largely imported; this may be a serious danger to digestion.

As regards soap I consider that if this industry is to have a fair chance Government must intervene to prevent the sale of the rubbish called soap frequently placed on the market at prices which seduce the ignorant who, seeking cheapness, buy that which is *not* soap to the detriment of the genuine article. The oils from which soap can be made—including rosin if used—do not cost less on an average of all usual oils and fats, than Rs. 15 per cwt.; 1 cwt. makes 1¼ cwt. of soap, at an expense of, say Rs. 5, for caustic, fuel, superintendence, labour, deterioration, interest etc. Consequently *genuine* boiled soap, containing as it should 62 per cent fatty acids (including rosin if used) 8 per cent alkali and 30 per cent water of constitution, costs *at least* Rs. 20 per 1¼ cwt. and cannot be profitably sold under Rs. 22 or Rs. 15 per cwt. Hence soap sold with manufacturers' profit at prices much below this rate, even where the glycerine is fully recovered and pays all the profits of soap manufacture, cannot possibly answer the above requirements, and must contain an undue quantity of water, to say nothing of other fillings. Bar soap has been obtained in Madras which, originally in 3 lb. bars had shrunk to little over 1 lb. per bar; soap experts in India have found soap with only 20 and even 12 per cent of fatty acids, with which may be compared 10 per cent samples as mentioned by Dr. Lewkowitsch. If then the valuable nascent soap industry is to be fostered in India, Government should enact that no soaps whether imported or locally manufactured, should be sold as soap which contain less than 58 per cent fatty acids or more than 35 per cent water, and that fillings or admixtures should never exceed 10 per cent (unless perhaps in the case of special medicated soaps) of any other substance than fatty acids (including rosin) water, and alkali. The New South Wales law requires 59 per cent of fatty acids, and any admixture of fillings must not exceed 10 per cent and even this product must then be sold not as soap but as "soap mixture". No one can legally object to the fair competition of genuine soaps like "Sunlight" (provided they are sold at true prices and not dumped at below cost price in order to kill a competing industry), but actual and would-be manufacturers must protest against the competition of water-filled rubbish at half prices. Samples of water-filled soap specially made and obtained to illustrate this point will be shown to the Commission Confidential statements will also be made if desired.

It is to be remembered that where an industry is *nascent* and can only begin, generally in India, on a *small* scale, such industry may easily fail by reason even of fair competition on the part of great outside manufacturers without any desire on their part to kill the infant industry. For instance, suppose a man starts a petty soap factory which will just pay interest, profit, etc., and give him a living, if he can make and sell 30 tons of genuine soap per week which about suffices for his local existing market; then if a large foreign firm with a great name and reputation and heavily advertised and well pushed goods, enters the market even at equal prices, the small local man must be ruined since the local market on which he depends will, at least partially, accept the foreign goods, and he will thus fail to sell the 30 tons which, *ex hypothesi*, is necessary to his existence, unless he can, by extraordinary effort, develop the local market to an unexpected extent; even so he will still have the foreign competitor against him. Much more serious is his plight, if owing to the absence of a law against adulteration or water-filled soap, the competition is *not* fair competition, but that of cheap adulterated good, against genuine. This last case has actually occurred.

I consider then that the Department of Industries should examine the case of all industries where adulteration and sophistication or "shoddy" articles, either imported or locally manufactured, are to be expected, should obtain the passing of laws regulating the manufacture, contents, description, etc., of the goods, and forbidding the import or sale of goods not answering such description, maintain an expert staff and laboratories for the examination of such goods found in the markets, and prosecute for offences. This is only what is done elsewhere, e.g., in Japan by Government offices and Trade guilds, in America by the Departments dealing—for instance—with "pure food" and by the Associations and their laboratories belonging to particular trades, e.g., the 'Canners' Association" at Washington, and so on. The matter is one for the collation of foreign laws, regulations, and methods, and adaptation to the needs of this country.

I may refer to my * "Note on Agriculture in Japan" paragraphs 193, 194 and 202 and to "Note on * Fisheries in Japan" paragraphs 116-118 as regards the Associations founded there for the standardization and protection of sound goods, especially those for export, and for the detection and punishment of fraud. I learn from the Year book of 1916 that the work of these has been immensely developed so that 559 guilds relating to "Staple Commodities" dealt in 1912 with a volume of goods valued at £119,000,000, the members of the guilds numbering over one million. Government working with these guilds are gradually enforcing standards of production which should shortly, as has been similarly done in Germany, relieve Japanese goods from any odium loci. These associations are mentioned here only because one of their specific duties is the enforcement of sound standards, but obviously their beneficial influence is far beyond that specific benefit; in Japan industries are enormously helped (1) by Associations of all kinds (2) by Government working on and through these Associations; it is Sir Horace Plunkett's (and others') ideas for Ireland but anticipated and much more highly developed.

Another plan is also available, viz., that every manufacturer shall in matters of food, drugs and medicines, manufactured articles such as soap, or products such as ghee, indigo, beeswax, etc., enter on his goods a statement or guarantee that they contain absolutely pure or so much per cent pure of the concerned article, or that they contain no specific additions, or only specified additions and percentages of additions. On my fish paste price lists I place a label guaranteeing that they contain nothing but pure fish, milk, and butter and no other animal product: my soaps are guaranteed as genuine unfilled soaps, and I am quite prepared to add a percentage guarantee which is even more than "Sunlight" does. Manufacturers of soap would hesitate to place on the market soap with a label "containing 60 per cent water" (instead of 30 or 32), and 60 per cent is known to be by no means a maximum. The beeswax market could not have been spoiled if a guarantee had been required either "containing so much per cent of paraffin wax" or "guaranteed to contain no paraffin wax or other adulteration": ghee would hardly sell if it bore a label "guaranteed to contain no ghee whatsoever" as analyses have shown.

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* Not printed.

The method would, as in the first method, require for correct treatment the formation of standard tables but even this would not be absolutely necessary if labels were simply required to guarantee purity, or that an article professing to be a specific article e.g., beeswax, were forced to assert that the article contained nothing but beeswax or was 98 per cent pure, etc.

General.

Section X—Q. 110.- A copy of a memorandum which I am preparing on the further development of the fishery industries will eventually be sent to the Commission. Deep sea exploration and fishery charting by a modern boat with skilled officers, assistance to the fishermen for building larger boats and nets and preservative plant for deep-sea use (some with motor power), the taking over of the 120 public fish-curing yards from the Salt Department and running them with developed methods, the fostering of a demand for the various new products, the stimulation of manufacturing industries such as canning, fish-oil and guano manufacture by improved (steam) methods, the utilisation of by-products, the provision of inspectors and instructors in the several branches, the development of a loan system for the purchase of boats, nets, plant, etc., and for the repayment of usurious loans somewhat on that of the Agricultural and Land Improvement Loans Acts, the promotion of co-operative work especially for the purchase of fishing and industrial plant, for curing and for the sale of goods, the education of the boys and girls in half-time schools, and statistical and regulative work, will be main lines of recommendation.

Similarly for the infant soap industry, the conduct for several years of further experimental work both technological and commercial, the collection and local manufacture of plant, the search for and trial of new materials, [e.g., punna oil (Calophyllum inophyllum), dupa fat (*Vateria Malabarica*)], the preparation and popularizing of the *highest* classes of soap in addition to ordinary soaps, the preparation and utilisation of perfumes such as that from the Calophyllum inophyllum, and of essential oils such as oil of wintergreen extensively available on the Nilgiris, cheap methods for the recovery of glycerine, the ascertainment of the soaps in greatest demand by the public and most suited to different localities (e.g., those where hard and brackish waters are general) or classes of consumer (e.g., those who object to animal fats, textile manufacturers, etc.); the training up of skilled foremen, instructors, and artisans, are all methods of development which will have to be pressed. For development outside of the Government factory very little will be needed except the instruction of foremen in the Government factory, loans to small manufacturers for the provision of plant, and legislation (as suggested under Section IX) against the manufacture, importation, or sale of soaps which are soaps much more in name than in efficiency. The purchase of locally manufactured soaps by Government Departments would be a very great stimulus, e.g. of saddle soap and ordinary soap by the Military Department, of plain and medicated soaps by hospitals, schools and institutions, and so on. It is also probable that a glycerine refining plant would at first be needed at the Government Soap Works, to utilise the crude glycerine from the several small soaperies which will probably soon be started; this could be sold to a factory after its use and methods of working had been fully demonstrated.

The railway rates are fairly liberal though freight on oils and fats might possibly be lowered; in fact both the Southern Mahratta Railway and the South Indian Railway have, at my request, included soap as an article which will be carried at half-parcel rates; this is a liberal concession, and it is hoped in this way to develop a large trade in parcels to petty retailers and to consumers, thus to a great extent eliminating the middleman; it is found that even in villages such as Tanur there is a considerable retail sale of soaps even of the toilet grade, and these shops require only small parcels which they could obtain direct from the factory.

It is not permissible to mention, " protection " in the sense of protective duties as a means for developing industries so that the part of Hamlet must be totally omitted, but it is right to mention protection in other ways. For example, caustic soda and potash, soda ash, sodium silicate and sulphate and other chemical essentials to the soap manufacture are charged 7½ per cent duty which is a heavy burden on a nascent industry since none of these products is, or at present can be, made in India as a purely indigenous product. Now under item 131 of the Schedule in Notification No. 286-C-D. of the 16th December 1916 by the Government of India, soda ash, sodium sulphate and other chemicals—including " glycerine substitutes "—are admitted *free of duty* if intended for use in cotton weaving mills; similarly sheet lead dutiable at 7½ per cent *ad valorem* pays only 2½ per cent if for tea chests. These instances show exceptional treatment for selected industries, and since this class of treatment is extended to great industries run in large factories and estates with plenty of capital, knowledge, experience, and expert control, and thoroughly well established, surely such privileges should be extended to small and especially to *nascent* industries; e.g., caustic soda and other chemicals needed for soap manufacture should be admitted free of duty, at least to all factories which turn out soap which satisfies Government standards (see Section IX s.v. " adulteration ").

The exemption of these and other nascent industries from income tax say for the first 3 years after the factory has begun work, should be granted as a matter of course. It is generally a fact that the true profits do not warrant taxation for the first year or two;

but even if there are taxable profits it is wise to forego taxation not merely as a bonus or bounty to enterprise, but to avoid the inquisition precedent to taxation and the chances of undue taxation. The fear of income tax may be but a straw's weight but it may just be the straw which decides against venturing on an unknown industry.

There are (question 111) many industries which are peculiarly suited for development in this country whether by reason of material, labour, or market; I append a list with brief remarks to each. For some articles I have been able to obtain figures as to imports showing the present supply of such goods *ab extra;* this of course is not at all the same as the potential demand which would be probable in case of a larger visible supply or of the supply of goods needed but not obtainable.

I consider that of all industries, those of "Fisheries" and "The oil and fat combined industries", are far and away the most important for this Presidency; Fisheries because when developed—

(*a*) they will produce far more and far more wholesome food than at present,

(*b*) they will develop, both socially and economically, a very large number of people who are now in a low and dependent condition,

(*c*) they will develop or originate various by-industries such as boat building, coopering, etc.,

(*d*) they will assist agriculture by large supplies of concentrated manure.

"Oils and fats" because the linked industries will on a great scale utilise on the spot the raw products which are in such vast abundance and will utilise them at their best and freshest and cheapest, will assist agriculture by retaining the oil cake in the country, will provide masses of edible products, will develop a whole series of industries new to India and thereby not only add a series of desirable and necessary manufactured products but will, *pro tanto*, raise the intelligence of the working population.

I therefore commend these two industries to particular attention by the Department of Industries.

IMPORTS (Lakhs of rupees; mostly in round figures).

Articles.	1888-1889 (round figures).	1913-1914.	From Germany and Austria, 1913 1914.	From Japan.	
				1913–1914.	1914–1915.
1. Umbrellas and umbrella fittings ..	41	53·7	9·9	6·8	4
2. Toys	15	26·7	13·6	5	3
3. Glass and glassware	66	195·0	116	15·8	19·9
4. Pottery, earthenware and porcelain ..	(not known.)	63·5	10·8	6·3	4·2
5. Soaps	10	75·0	2·8	0·5	0·53
6. Candles	8	7·4	0·4	*Nil.*	*Nil.*
7. Paints and colours	31	64·0	4·3	*Nil.*	*Nil.*
8. Oils and fats, including mineral oils ..	200	383·6	33·0	negligible.	*Nil.*
(*a*) Animal	..	11·4		..	..
(*b*) Essential	..	6·0	..	..	..
(*c*) Mineral	..	10·2	..	..	..
(*d*) Kerosene	..	287·2	..	..	..
(*e*) Petroleum	..	0·4	..	..	..
(*f*) Other kinds	..	35·8	..	..	..
(*g*) Vegetable (non-essential) ..	..	11·3	..	..	..
(*h*) Tallow and stearine	..	20·9	..	..	..
9. Leather	16	21·0	..	..	..
10. Do. goods		140·0	..	..	..
11. Furniture	10	24·0	7	·9	0·6
12. Clocks and watches	10	26·6	2·3	2·2	1·1
13. Rubber goods	..	52·9	11·4	negligible.	1·4

To these groups should be added the following as industries eminently suitable to this Presidency for reasons of material, labour, and market, viz., the manufacture of—

(14) Bicycles.

(15) Tin plate goods.

(16) Enamelling.

(17) Tanning extracts.

(18) Clock making.

(19) Electroplated ware.

Mr. Broderick [illegible].

(20) Prepared foods; including jams.
(21) Coopering.
(22) Village hand-loom weaving.
(23) Lace making, etc.
(24) Ivory and wood carving.
(25) Hats.
(26) Straw and grass matting.
(27) Inks.
(28) Adhesives.
(29) Buttons.
(30) Vinegar and acetic acid.
(31) The recovery of Potash and Magnesium Chloride.
(32) Essential oils and perfumes.
(33) Hydrogenation of Oils.
(34) Celluloid.
(35) The utilization of solar heat.
(36) Carpets.

(1) *Umbrellas.*—No one, especially on the West coast, will go without an umbrella if he can possibly afford one. There is nothing—except inertia or ignorance—to prevent local manufacture; the sticks and coverings are all locally available, and the ribs can be made with the simplest machinery. However many are made in India there is an import to the value of 53 lakhs. An export trade might also be developed in this article. Japan exports to a value of about 24 lakhs; mostly cotton umbrellas to China. We have Ceylon and the Straits Settlements at our doors for a similar trade. Enquiries in Calicut where the sales are large show that apart from complete umbrellas the several parts are imported as follows:—

Sticks—from England, Switzerland and Japan.

Frames—(ribs) England, Germany, France, Switzerland and Japan.

Coverings—England, Italy, Germany, Japan; the last named is inferior (as also the sticks, etc.).

Springs, etc.—England, Germany and Japan. Channelled ribs are preferred to solid as being lighter and stronger for the weight. Some work is now being done especially in Bombay, in preparing sticks, but practically—as regards umbrellas sold in Calicut—umbrellas are either imported whole, or else the parts are imported and merely assembled in India.

(2) *Toys.*—If there is any small industry fitted for this Presidency it is the manufacture of toys, provided there is proper organization. The industry, in a somewhat crude fashion, is indigenous; there are excellent woods and lacquers available, as in Kurnool, etc., there are clever artisan classes accustomed to wood work, and for months in the year, especially in the hot weather, the villagers have little work; hence this should be organised as a village or cottage industry, instruction being given in the classes of goods required of which a collection should be available in the district museum. Metal toys can usually be made by stamping and common fitting. The value of imports is 26·7 lakhs, being a large increase from the 15 lakhs of 1888-89. It is noteworthy also that with our cheap labour and material an export trade is possible; in Japan the manufacture reaches a value of about Rs. 60 lakhs, of which one-fourth goes to America and England.

(3) *Glass ware.*—Under this head I allude only to common glass manufactures which alone seem possible in this Presidency. Bottles, glass vessels for jam and other preserved foods, glass battery jars, etc., could be supplied if a glass factory can be run at Madras; possibly the Nilgiris where climate and fuel are far more favourable, should be tried if Madras fails. The freight on cheap jars from Europe for preserving fish, fish pastes, etc., is almost prohibitive; this preserved food industry could be greatly developed —as also those in inks, adhesives, etc.,— if cheap glass jars were available.

But *bangle glass* can be made in many places, though recently knocked out by Austria from which the glass imports in 1913-14 were valued at above 89 lakhs. This manufacture is simple and indigenous and is hereditary among certain classes but is wasteful of the expensive item of fuel; I have seen in villages (Anantapur district, etc.) every step of the manufacture. What is wanted now—*inter alia*—is local technical instruction so that greater varieties of ornamentation, colour, etc., may be produced; the Austrian bangles are often really artistic and ornamental as well as cheap. There should be complete collections in the several central and district museums. It is even a question whether this glass could not be utilised in making common [illegible] jars, etc.; the temperature required for fusing the mixtures is low, viz., a bright red heat, which minimizes certain difficulties such as those of fuel, working, etc. See [illegible] to questions 25—27, section II and items 27—29 below.

(4) *Pottery and earthenware.*—So much profit is made on tiles, [illegible] such-like goods and so numerous are the orders, that ordinary good class [illegible] developed in this Presidency though stoneware jars for ghee, oils, [illegible] shops and houses are greatly in demand and fetch purely fancy [illegible] suggested are not white china or earthenware, but the stoneware [illegible]

for household jars, gallipots, ginger beer bottles, sanitary goods, etc., but ware for battery cells, porous cells, and even insulators eventually could be made. For years I experimented when Sub-Collector, in correspondence with the late Mr. Chisholm, then at the School of Arts, and made very good vitrified bodies, and porous bodies with a lime borate glaze. I found a fine grey clay, burning stone-white and hard as flint, at Trichinopoly, and the finest felspar (orthoclase) in the world, burning pure white as it fused, at Erode and in the Cauvery valley (Namakkal taluk of Trichinopoly, etc.), in such profusion that it was used as road metal; moderately good kaolin is available in many places and other body clays also. There should be Government enquiry and assistance in this matter by real experts. It is understood that Messrs. Parry & Co. have imported a special expert for making acid jars at Ranipet (near which there is an indigenous glazed pottery industry of very poor quality technically), and exhibits, which seemed of only fair quality however, were shown at the recent Madras Exhibition.

(5) *Oil and fat industries.*—These linked industries, viz., the extraction of oil from our various nuts and seeds, and the working of them up into manufactured products (vegetable butters, soap, glycerine, candles, paints and varnishes, etc., form together an industry which should be the fourth or fifth largest in the Presidency; in fact it or they form one of the very few great industries possible in this Presidency, and should be treated from a wholly different point of view from the various small industries which are mainly the subjects of this note; the linked industries form potentially one great industry, and one which will do more for agriculture, and for the food supply of the country than any other which I deal with in this note. Agriculture, weaving, fisheries, oils and fats, and leather, followed by pottery and wood products, seem to me the main large industries of the Presidency, and amongst them oils and fats have been neglected though of the greatest promise. I consider that the subject is so great and the possibilities so vast that it ought to be dealt with direct by capitalists rather than by Government and that perhaps Government should spend its efforts and money rather in collecting data by means of a special survey by a first class oil expert and by publishing these data widely in order to attract the attention of capitalists, rather than by small local effort. It is only in or because of the absence of capitalist enterprise that Government have had to step in (e.g. in obtaining a small expressing plant, soap manufacture, etc.) and even then it is more for the purpose of collecting facts for advertisement. But for the war and but for the absence of real business data it is more than possible that great English firms would have entered the field in two or three different branches of the linked industries: one firm in correspondence with myself was, in 1914, considering the taking up of one very large branch not yet attempted in India; another was talked of as about to establish a soap factory on a vast scale in Bombay; a third was talking of preparing and marketing ghee and butter substitutes. It may not be generally known that Messrs. Lever have quite recently (1913) built a splendid soap factory, costing many lakhs, in Japan, and with the developing soap trade in India, the raised tariff, and the possibilities of our abundant oils, we may possibly see British firms at an early date taking advantage of this branch, including of course glycerine and probably candles. We require in vast quantities sound and sweet edible oils and fats, free from all adulteration or from admixtures which might be objected to from caste or religious prejudices or merely from a dietetic or physiological point of view; we need to retain in the country the enormous masses of oil-cake so necessary for the cattle and for the soil; we want to obtain economically from our raw material the largest possible quantity of the sweetest oil fit for use or export as edible oils and not merely—owing to most serious acidity—as soap stock: we need and are demanding soaps of all classes, glycerine whether for cordite or pharmaceutics or industries, candles, paints and varnishes. For all these the field is immense not merely within India but in the areas from Egypt to China, when considered with our enormous production of the finest raw materials, and is ripe for expert examination and for a business survey such as is suggested under section II, and I suggest the appointment of an expert, especially one who has dealt with the matters from a manufacturing point of view, to survey the whole field and collect data for the use of the capitalist.

Meanwhile of course, in the absence of capitalist effort, Government pioneer work should continue, for after all, the capitalist, however possible or even probable eventually, has not yet made a definite appearance.

(6) *Soap.*—This is being attempted and with some success by Government, and no more need be said as to its development beyond what has been said above and in sections III and IX. Glycerine is a necessary product in soap making and will share in its success or failure; a recovery plant is under manufacture in England, and a refining plant will be ordered after the war. It will of course be a desirable product for the Cordite Factory and for pharmaceutical and other purposes; e.g., as a useful medium in [illegible]

[illegible] *Candles.*—The demand for these is fairly steady having been about 8 lakhs in [illegible] and 7·3 lakhs in 1913-14. There is a small Indian industry in this article, but [illegible] imported stearine, except, I believe, in Baroda; a Madras factory recently [illegible] stearic acid for this manufacture. The manufacture of stearic acid by the hydrogenation of oils is a possibility not to be lost sight of in the promotion of the hydrogenating industry, since fish oils can be hardened solid by moderate hydrogenation; such oils-cum-stearine cost only about £11 per ton so that the stearic acid should cost less than £20 ex factory. With paraffin wax from Burma, the candle industry should develop, and imports should practically cease.

(8) *Paints and varnishes.*—The imports here have risen from 31 lakhs in 1888-89 to 64 lakhs in 1913-14. Seeing that India is the principal source of linseed oil, it is absurd that it should be dependent on imports for its needs. There is nothing mysterious about the paint industry; an expert or two from home would easily set the industry on its legs; what is most needed is experience plus honest care in selecting, mixing, and grinding. At present we have some paints in the markets; possibly of indigenous manufacture, which are miserable in covering power, appearance and durability, and it is almost waste of money to use them, especially for outside work in our sun. Similarly as regards varnishes; our lac and gums are abundant and of the finest; the oil varnishes could be made with the same ease as paints, while spirit varnishes might be made in bonded shops—like distilleries—with duty-free pure spirit, or elsewhere with methylated spirit. I advocate the importation and employment of home experts (factory managers or foremen) rather than the despatch of students for study in England. The manufacture of oil-cloths and linoleums is also desirable; these goods are in considerable use in many parts of India and if prepared against attacks by white ants might be still more in demand.

Essential oils were imported to the value of Rs. 6 lakhs in 1913-14; it appears to me that this industry is specially capable of development in India where plants producing strong essential oils are readily grown and where strong perfumes are so greatly in demand by Indians for hair oils and ointments, soaps, etc.

(9 *and* 10) *Leather and leather goods.*—I merely draw attention to the imports which show so large a demand (161 lakhs) while India, especially Madras, produces such enormous quantities of skins. *Prima facie* this is eminently a case for attention by high class experts of practical experience in the production of moroccos and other fine leather goods. But on this matter Mr. Chatterton will doubtless specially advise the Commission.

(11) *Furniture.*—I merely draw attention to the increasing demand (10 to 24 lakhs of which 7 lakhs were supplied by Austria-Germany), which ought to be fully supplied from within. This was one of the subjects specially studied by the Wurttemberg authorities with great results to the home industry. See "School of Arts" paper in the "Book of the Madras Exhibition."

(12) *Clocks and watches.*—Imports 26·6 lakhs from 10 lakhs in 1888-89, and Japan has already entered the Indian market with cheap lines of clocks. This is mainly a matter of machinery for the classes of goods required. I have obtained lists of machines from America but have not been able to pursue the subject. Considering the abundance and cheap labour of goldsmiths and others accustomed to delicate work in metals it appears to me that with a proper line of machines for making standard stampings, screws, etc., clocks and watches might be assembled with ease, cheapness, and accuracy of result, provided expert superintendence and instruction is given in a (Government) factory, where managers, foremen, and artisans could be trained. At present many of the cheap clocks and watches give satisfaction, but many do not, and in that case have mostly to be thrown away as there are insufficient local means of cheap repair or replacement of defective parts. This subject would be specially displayed in the Commercial Museum at Presidency cities.

(13) *Rubber goods.*—The production of rubber in Madras, Travancore and Cochin already amounts to millions of pounds, practically the whole of which is exported. On the other hand rubber goods, properly so called, are imported to the value of 53 lakhs, apart from many articles which do not appear as rubber, such as electrical goods (vulcanite battery cells), fountain pens, combs, and other vulcanite or ebonite articles.

Doubtless the manufacture presents difficulties, but the facts of production and importation show that the matter is one for early attention; the demand for tyres of all sorts, rubber stamps, electrical goods and so forth is rapidly increasing, and the industry presents attractive features. If a cool climate is required, the Nilgiris or Bangalore are suitable.

(14) *Bicycles* are greatly used and would be still more so if cheaper. The parts of bicycles are or may easily be standardized and produced in quantity by engineering firms; these can be assembled and fitted either in the same shops or in small separate shops. This is the plan adopted at home with B.S.A. fittings. With Tata steel, Bombay, Calcutta, Madras, etc. forgings, local fitting, Indian made rubber tyres and the absence of freight import duties, packing and other charges, bicycles could probably be considerably cheapened and the demand *much* more than proportionately increased.

(15) *Tin plate goods.*—There is a large demand for stamped and soldered tin ware, both domestic and industrial, such as canisters for spices, tins for biscuits, etc., cans for preserved foods, small drawn or other tins for ointments, medicines, samples, etc., toys, etc. The small value and great bulk of tin plate goods when made up abroad and sent

to India, makes freight charges prohibitive, whereas tin plate in boxes takes less space per ton than almost any other article. In my fish canning business I require several sorts of tins for which I have no dies or seaming plant, and as canning increases there will be a greater demand; in one case I am aware of, a small syndicate would probably take up fish canning but for the cost of can-making plant, and they have actually resorted to cutting up kerosine tins and fitting them by hand. The plant is not expensive, and once adjusted and provided with a selection of dies, can produce any quantity of goods; my single drawing press can stamp 50 sardine tins from the flat in 5 minutes. No particular assistance is needed, except that of directing attention to the need, the instruction of mechanics, and guidance in the purchase of plant.

The Industrial Museum should contain drawings and priced catalogues of machines and dies required and when possible models or, still better, specimens of stamping, cutting, crimping, and seaming machines, the last named being specially needed for all hermetically sealed work in view of neatness, strength, and saving of solder.

(16) *Enamelling.*—This has two sides, viz., art enamelling for which the Indian goldsmith should be an apt pupil but on which I can say nothing except that the present Superintendent of the School of Arts is most competent to advise as an expert in that art. The other is the industrial enamelling of steel for domestic ware. Whatever its disadvantages, this class of goods has come to stay, is now in very general use, and its manufacture should be taught in a Government pioneer factory or in an assisted factory.

(17) *Tanning extracts.*—Nowhere perhaps is there a greater abundance actual or potential, of the raw material [barks (cassia and acacia) myrabolams, and pods, e.g., divi-divi] than in this Presidency, but the export of such bulky material is, except as regards myrabolams, prohibitive; the preparation of extracts, now more in demand at home than formerly when oak bark and valonia were almost the sole tanning agents, should be an industry worth attention. I was approached on this matter some years ago by a great firm of tanners in the West of England, but could do nothing, and there was no department to which the matter could be referred.

In districts of poor gravelly soil such as Anantapur, large parts of Coimbatore, etc. the Cassia auriculata (tangedu) grows wild abundantly (as also various acacias), but it is in the cultivation of the shrub that there seems a large opening. Anantapur possesses hundreds of thousands of acres of suitable land, lying entirely waste, and in many villages there are thousands of acres in large blocks; the assessment is from 2 to 4 annas per acre, but may run up to six. These lands could be obtained for cassia planting on nominal terms—free of assessment for some years—under *existing* standing orders, and it is to plantations that we should look both for improved shrubs and for vastly greater quantities. The cassia auriculata has the singular advantage that it is the one vegetable product which goats will not even touch, so that fencing is not required and watching is a minimum.

The "divi-divi" and other trees can be grown on similar lands with greater facility, while the myrabolam production of the hills (Shevaroys, etc.) could be largely increased by a better demand.

(18) *Lock making.*—There is already a small industry; the prices however are unduly high and the industry is small partly because prices akin to those of the best English make are demanded, partly because the manufacture is at present almost a family one, and not a general industry. The common country lock and padlock is a miserable agair, and the manufacture of modern locks at a moderate price should be fostered. The demand is immense; every shop needs several and domestic needs are equally large. It is believed that Government take certain classes of locks and padlocks, but this might be extended if private enterprise will take up the matter. A small pioneer workshop might be started where artisans could be trained, and provided with a small loan from Government for the purchase of material and tools. The industry is certainly one which co-operation could undertake.

(19) *Electroplated ware* is specially mentioned because in this country oxidation and the formation of poisonous compounds in vessels made from copper alloys are so rapid, while the love for silver is very great. Many respectable houses would gladly buy vessels of customary shape, etc., in electroplated ware if provided at moderate rates; this would obviate the labour and loss in the scouring of vessels of brass and alloy, and the risk of metallic poisoning. The plant is inexpensive and the art could readily be taught in a technical school. The process would be applicable to articles other than domestic vessels.

(20) *Prepared foods, including jams.*—This industry seems especially suited to India as subsidiary to its agriculture. Numerous preparations of wheat, such as macaroni, vermicelli, shredded wheat, broken wheat, "force," "grape-nuts," semolina, etc., are in large consumption in this country and could be replaced by local products under suitable expert guidance. Ragi, when properly husked and ground, yields a delicate and nutritious food which is also very palatable and attractive in appearance. Semolina is simply a better class "rolong" or wheat meal, universally used in this

Presidency. Maize is sufficiently grown to provide " corn-flour " or other maize preparations imported from America. " Revalenta Arabica," a once famous prepared food now partially displaced by the scores of others, consists largely of Indian dhal (" Ervalens," with a slight transposition of lettering), and is a most nutritious food. Jams of foreign manufacture are in great demand notwithstanding their cost which, retail, may be taken at 8 to 10 annas per lb. in normal times ; whereas with sugar normally at 2 annas per lb. it is possible to make jam from peaches, Cape gooseberry, loquots, guavas, tree tomatos (and ordinary tomatos), pine apples (West Coast), plantains, etc., at less than half those rates; for marmalade we have every orange in abundance at nominal prices for the fruit, and there is absolutely nothing but knowledge and enterprise required. The citrus class of fruits grow readily and abundantly especially under moderate irrigation and could be crystallized and sold freely and cheaply; in the West Indies the flesh of the guava and other fruits is also crystallized. For containing these articles tin canisters would be made as proposed above in local factories, but jars or earthenware and glass are badly needed. The preserving plant required is simple, the processes are equally so and within the capacity of any cook. Other preserved foods are canned goods such as those now prepared in the Government fish cannery, besides many other similar canned preparations. Sauces and pickles as now imported, and others, can be readily made; the famous " Worcestershire sauce " is from a Madras (or at least Indian) recipe, and some of the best pickle recipes are of Indian or West Indian origin. Biscuits are in enormous demand and a vast number of Hindus and Muhammadans generally, will and do eat them, even when of foreign manufacture, without scruple. There is a very small biscuit-industry in existence (e.g., in Mangalore), but even in Madras there is no development such as is connoted by various British and Australian names. Yet the biscuit industry presents no serious technical difficulties, beyond a proper mixing and baking plant, good recipes, and expert attention ; the raw materials and market exist.

For goods under this head a school of industrial cookery is needed, and for the present this may be developed at the Government Cannery, where there is much spare time which could be well occupied in experimenting on food preparations; it has already been decided, subject to Government sanction, to begin during the approaching off-season.

(21) *Coopering* is an industry which needs developing, though fairly well practised in Cochin. But suitable woods are dear and scarce; easily worked woods are apt to be too porous, while the average cooper requires instruction in accuracy. Fisheries work in pickled fish is largely held up for want of proper containers, and it is a question whether barrels from paper pulp, wood pulp, or saw dust mixtures, will not be the best solution of the difficulty. Experiment and instruction are needed both in ordinary coopering and in these lines; impervious paper or wood waste barrels, boxes, and containers of various sizes and shapes would be valuable in this and other industries and would open a demand for the half-stuff, mill-board, etc., which the Punalur and other mills may produce.

(22) *Village hand-loom weaving.*—There is probably no industry, the maintenance of which is more important than this; no one who has lived up-country can fail to be interested not only in its maintenance but in its development both to higher grades of work in company with associated industries (lace-making, embroidery, etc.), to increased output by improved mechanical aids, and to the organization of the community probably on co-operative lines. In the " Indian Year Book " for 1915 there is an article on the hand-loom weavers (by Commissioner Booth Tucker of the Salvation Army) which puts the matter clearly and to which I solicit reference ; remarks in a paper by Dr. Barker on page 425 of the " Book of the Madras Exhibition " are also in point. Leadership, organization, co-operation (insufficiently recognized in the Indian Year Book article which seems to look rather to outside leadership), technical and general instruction, mechanical aids (better looms, warping machines, etc.), business arrangements for producing and marketing, are obvious necessities. Fourteen years ago I suggested that the co-operative use of a very simple warping machine, as used in the Coimbatore Jail, from which the evenly laid web passed through a size bath and squeezing rollers on to a receiving roller, would immensely save labour and improve both the warping and sizing of the web; the receiving rollers could be removed and supplied direct to the weavers who might either use them in their own cottages or in a co-operative working shed; this in conjunction with better looms would satisfy to a great extent the demand for mechanical aid. The condition of the hand-loom weavers cannot but remind one of the linen hand-loom weavers in Wurttemberg (Lachingen) and their miserable position till their industry was taken seriously and systematically in hand by the Central Industrial Bureau; their story may be read in the Recess Committee's report and was mentioned to me in Wurttemberg; what was done there can be done in India. It is a mistake to think that the village industry is dying merely through factory competition or displacement ; a census not many years ago showed more hand-looms at work than in the beginning of last century when factories and British competition were unknown, the fact being that the population has increased from 12 to 40 millions so that factory woven goods have a large market in supplying the increment without necessarily displacing the hand-loom industry. To my mind it is essential that, factory competition and possibl

developments notwithstanding, the ancient hand-loom industry should be very specially taken up, organized, and developed after the Wurttemberg fashion; it is essential that there should be village and cottage as well as factory industries side by side with the agriculturists, if only that village life may be made more intellectual, interesting, and self-contained, and that, with other village industries added, there may be employment for waste labour in the non-cultivating season. I have seen this industry now for 47 years in the villages of almost every district from Tanjore to Anantapur, and there has been no general progress such as is certainly possible, as shown by isolated efforts, e.g., of the Salvation Army and other Missionary bodies, and as shown historically in other countries even where factory competition is far more intense and adjacent.

(23) *Lace-making, etc.*—The lace industry is a non-indigenous comparatively new industry, entirely developed during the period of my Indian service, originated and almost solely developed by Missionary skill and enterprise. It is obviously suited in a high degree to the Indian villager as a cottage industry, especially among women of the weaving class if displaced from their share in cottage weaving by the use of warping machines, or by the competition of the factory; its present development may be greatly increased by instruction, advertisement, and the organization of markets. The Victoria Technical Institute does something in the way of advertisement and encouragement, mainly static; what is wanted is industrial and commercial dynamic. The concerned bureaus of the Industrial Departments in Wurttemberg and Ireland (and Japan) were not content with receiving and displaying goods at a central hall, but obtained patterns, material, instructors from the best centres of foreign production, opened markets (e.g., in London, etc.) for the products; they both stimulated and improved production and found markets for the products. As regards instruction it is natural that Missionary bodies work amongst their own poor and are not interested in flooding the market with goods; hence instructors for the general workers must come from outside; the special threads and material required for various sorts of lace must also be sought out and provided—at first—by departmental effort. As for markets, a mere display in a Madras hall is insufficient; the department should arrange for displays and agencies in other countries where there is a known demand for hand-made lace: that of the United States is, I am informed, illimitable; indeed it has been stated to me in both countries that only the paucity and irregularity of the supply prevents an effective demand; even in this Presidency the demand is far less than it might be because orders for particular grades or patterns cannot be filled without grave delays; I find that the Victoria Technical Institute also mentions this deficiency and irregularity of supply as an "ever present difficulty." The same suggestions apply to embroidery and art work, with the additional remark that much good work is spoilt for market purposes by the inferiority of the foundation material; the work is often in striking contrast to that of Japan.

I consider that this subject should be taken up very actively by the Department of Industries, probably in conjunction with the Victoria Technical Institute and the School of Arts; the collection and organization of patterns, materials, instruction, regular supply of goods, advertisement and display, markets are essential to make this and the hand-loom industry a live industry. The declared object of the Victoria Technical Institute is the fostering of art industries, but it is also stated that "the sales are not conducted on commercial principles," (see a paper in the "Book of the Madras Exhibition") which also shows that the Institute is not sufficiently organized for the instruction and development which are essential to good progress, and for which an organized bureau is necessary.

(24) *Ivory and wood carving.*—This indigenous industry is under the fostering and capable care of the School of Arts coupled with the Victoria Technical Institute, but requires, to my mind, the addition of a commercial side as mentioned under item 23.

Mr. Hadaway's too brief paper on "furniture" in the Book of the Madras Exhibition is altogether admirable, and one may hope that with more active financial and other encouragement this great branch of industry may have an early and progressive future; the woods available are so excellent, labour so cheap yet naturally artistic, that there is no excuse for the absence of a high class industry, whether for export or local use.

(25) *Hats.*—Under this head I include merely the "Panama" class, for which, in its several grades, fibre, grass and straw, there is a considerable foreign demand. The true Panama material is probably not available in this Presidency, but grass and fibre hats could be extensively made from many of the excellent fibres and grasses available by the skilled grass and mat weavers of the Presidency. The fibre of the screw pine is believed to be particularly suitable for this work and has already been used for hats, but there are many others. In a paper by Dr. Barker, page 428 of the "Book of the Madras Exhibition", a new but self-started industry in Travancore in the weaving of grass hats is expressly mentioned, and a perusal of any paper (e.g., in the Society of Arts Journals) on Panama hats will show that this industry may easily be adapted to our materials and men. In Japan straw and "chip" braids or plaits for the hat manufacturing are a modern industry (since 1868), but the exports alone in 1912 were valued at 81 lakhs of rupees besides hemp braid exports valued at 165 lakhs, though this latter industry is not 20 years old. These are real village industries and we have the finest fibres (sann hemp Nilgiri nettle, screw pine, etc.) in abundance.

(26) *Straw and grass matting.*—The grass matting of this Presidency is well known for its excellence, but is at this day no further advanced—if not retrograded—from what it was 50 years ago.

The grass mat industry exists in several districts such as Tinnevelly and Malabar (Palghat), where suitable grasses and the hereditary industry co-exist, but is possible everywhere in one shape or other, since fibres of the best sort and straw are found in every district. From Tinnevelly I have had a fibre or grass sleeping mat as fine and flexible as fine calico, and Palghat mats are also of high excellence; for countries such as the southern and other States of America they should be invaluable. The fancy mat industry in Japan is of recent growth and the products were largely exported to the United States till the tariff minimized it, but the exports in 1913 were valued at 60 lakhs of rupees, while the internal consumption, especially of mats for flooring, was of course immense. Apparently the mats in Japan are now woven in a loom of very modern invention, and this may be investigated. As a cottage product by the peasantry in their slack seasons, the industry is invaluable, and deserves serious attention from our Industrial Department.

It is probable that the success of the Japanese in these two items which are of modern growth, is due to the efforts of its merchants, backed by Government, to find an external market, and doubtless the close trade connection of the United States of America with Japan and its need for matting and light straw or fibre hats, led to the development of the industry. With proper business museums, and agencies or methods of show and display in both continents of America, there should be a large demand for Indian hats and mats. It is to be observed that, as in many other industries, the Japanese Government *enforces* certain standards on exported mats for which there is a special bureau; there are also trade guilds for maintaining proper standards in this and most other industries.

(27) *Inks.*—It is strange that imported inks should hold the market—considering the expenses of freight and import and the cheapness of the article—when the materials for the best inks are available and the demand considerable. Probably the absence of cheap containers, viz., common glass bottles and jars, is a main cause, since it is almost as expensive to send out empty jars as to send them full of ink. This is a serious reason for developing cheap glass and stoneware containers. The various vegetable tannins are numerous and of the first grade, and only technical instruction is needed, and the provision of containers. The stuff sold and used in the bazaars or manufactured with ink powders is unworthy of the country, and is quite unsuitable for use in fountain pens which should form one of the items of manufacture from vulcanite made in the country (item 13 supra).

(28) *Adhesives.*—There is considerable sale of these articles which are mostly imported: with small bottles of common gum or mucilage sold retail at 8 annas and a rupee, there is a large margin for profit, and it is absurd that such cheaply and easily made stuff should be imported many thousands of miles, when all the raw materials are at hand. Here again the question of containers is probably one of the main difficulties The gums, mucilages, and cements intended are not merely the natural gums, though these are abundant, but the manufactured articles such as dextrin, casein, etc.; the latter, an item in many first class cements, is already made and exported in considerable quantities in the Bombay Presidency. The finest paste is made not from wheat flour but from rice and is most useful for affixing labels to tins. The glue industry is practically, if not entirely, non-existent, whether owing to the character of the hides which may be deficient in glue pieces or gelatinous parings, or to the putrid condition of bone collections, so that the glue has been largely destroyed and which renders the effluent water from bone steaming so offensive that it cannot be dealt with, or from ignorance or want of enterprise. The matter should be investigated as there is a large demand for glue and an immense quantity of the raw material in hides, bones, hoofs, horns, etc. Enquiries have been made by textile mills and others for fish glue and this is being examined into by "Fisheries" but the fish skins of this Presidency are not a good source of glue and are usually consumed as food. Fish "maws" (swim-bladders) are being examined as sources of isinglass, as their export, unless they are very carefully prepared, is not very remunerative, while the glue is needed in India.

In the case of inks, pens, pencils of graphite or coloured pastes or inks, gums, and other articles of stationery, the several industries might readily be established if Government will guarantee that all its departments shall use indigenous goods and no others, if of a fair standard which could gradually be raised; perfect goods should not be demanded from the outset. There is an absolute rule to this effect in Germany and the pencil industry is a specimen of its success; the early Bavarian pencils were of moderate quality, but as the use of them in all Government Departments was compulsory the standard was rapidly raised till they reached the perfection which we associate with the wares of Faber Hardtmuth, etc. Whether the graphite and woods of this country will allow of such an advance as regards black lead pencils may be a question, but the principle is sound. Good technical instruction supplied for a few years by the Department of

Industries, the search for and indication of raw materials, the methods of refinement, a fair standard, and steady Government purchases, should establish these small but not to be despised industries.

(29) *Buttons.*—There is a great and growing demand for buttons both of the plain and fancy types, but there is no real industry in this matter, though it is mainly mechanical. The making of horn and shell buttons by hand is interesting, but it is in the manufacture of stamped metal, covered, celluloid, and composition buttons, and in the introduction of almost automatic machines for turning and perforating, etc., the horn, wood, nut, or composition buttons and in the ornamentation, etc., of the same, that there should be development. Much of the metal button imports is miserable, being the simplest possible stampings of the thinnest possible sheet metal which cuts like a knife edge; we want properly made metal buttons of proper gauge with turned over edges, covered buttons, china buttons, buttons stamped like tesserae, in powerful compressors from compositions which give beautiful results in smoothness, appearance, cheapness and durability, glass buttons, ornamental buttons, and so forth. In parts of Europe, especially France button making is a village industry of importance; Kropotkin mentions a button of felspar powder temporarily cemented with milk (or casein solution) the manufacture of which occupied 1,500 workmen producing about 4,000 lb. weight of buttons per diem; this gave work also in the cottages in sewing the buttons on to card boards. From Bourry (" Ceramic industries ") it is ascertained that the material is really a very fusible porcelain, the stamped buttons only requiring a few minutes in a muffle. There are, however, many other mineral compositions from steatite and kaolin with water glass, etc., etc.; the recipes and methods are very numerous. Germany and Austria have of late years taken an enormous lead in this matter, especially as regards porcelain, composition, and pearl buttons, including buttons from pearl shell waste and other powders which can be rendered artificially iridescent. In Madras, moreover, bangle glass could very easily and most usefully be employed in making the various classes of glass buttons, the making, colouring and ornamentation of which would be a very suitable industry. Ornamental buttons of chank and other shells, carved to fancy, would also be attractive and lucrative; chank buttons and sleeve links are already in the market and when well carved fetch high prices; this should be developed for home and foreign use.

(30) *Vinegar and acetic acid.*—These are now largely coming into use both domestically and industrially, e.g., acetic acid is needed for rubber coagulation, while acetone and calcium acetate are required by the Cordite Factory. For pickling fish it is also desirable, and for this purpose was lately manufactured—experimentally—at the Government yard, Tanur. The early experiments, with duty-free spirit, resulted, even with untaught staff and small, imperfect apparatus, in excellent 4 per cent vinegar at considerably below English rates, but there was necessarily great waste in the process. The great distilleries could make these products under the best conditions, using weak spirit straight from the stills, cooling apparatus, and chemical experts; Messrs. Parry & Co. (Nellikuppam) were asked to consider the matter, and it is believed that they have taken the matter up.

As regards the production of these articles by wood distillation, I need say nothing since the subject has been specially considered by Mr. Chatterton. It may however, be pointed out that at the Ootacamund Industrial Conference in 1909 the Conservator of Forests stated that eucalyptus plantations on the Nilgiris would yield annually, after 10 years, 100 tons per acre continuously of timber, and casuarina plantations on the sea coast 50 tons, so that if these woods are suitable for distillation there should be a large opening for the production of distillation products, including acetone, and solid charcoal. Even on the West Coast timber costs at the factories only about Rs. 5 to 5-8-0 per ton, and at the saw mills there is abundant waste in inferior woods, trimmings, saw dust, etc.

(31) The recovery of *potash and magnesium chloride* from the salt pan bitterns has been mooted, especially now that the *cost of experiments*, however considerable, would be recouped by a very small return in potash at its present enormous price, so that even if eventually found industrially impossible in ordinary times, the cost of the experiments would be recovered. The Salt Department are, it is believed, reconsidering the matter. It would be of great advantage to India if potash other than in the nitrate form, could be rendered available for manures, soap-making, etc., while the magnesium chloride as an additional product would greatly assist the magnesite and magnesia cement industry.

(32) *Essential oils and perfumes.*—The vegetable sources of these preparations abound in India and should form a very lucrative and elegant industry. That it has not hitherto been developed is no argument ; it is but recently that lemon grass oil has been made on a commercial scale, and citronella is a comparatively new product in Ceylon, while the very lucrative production of sandal oil in Bangalore on a business scale is an absolutely new industry, though sandalwood has so long been a favourite Indian perfume and oil. The imports of essential oils alone are annually worth Rs. 6 lakhs, apart from perfumes and other essences. In this Presidency alone there are many

materials, some entirely unexploited; the screw pine which grows wild almost everywhere, is deservedly called the "Pandanus odoratissimus"; its flowers are said by Roxburgh to be probably the richest and strongest perfume known; it is also a delicate and not a coarse perfume, and the festive use of the flowers is universal; the flowering period is considerable. The Calophyllum inophyllum so abundant in Malabar and South Canara, not only produces the cheap and abundant "Punna" oil, but its flowers, available for several months, yield a most delicate perfume; the Michelia champaka (champak or pagoda tree) provides flowers almost all the year round of the greatest fragrance, and there are very many others. The "winter green" of the Nilgiris, the oils of the numerous eucalypti especially of the more fragrant character (e.g., citriodora) are not yet or but slightly utilised, while the essential oils from the readily grown citrus families are entirely neglected. Apart altogether from other uses, every one of those named will be useful in toilet-soap making instead of the ordinary or even the synthetic perfumes. It would seem that the indigenous essential oils and perfumes should form a special subject of investigation by the Research Institute at Bangalore in conjunction with the Director of Industries, the Director of Agriculture, and the Forest Department.

(33) *Hydrogenation of oils.*—I consider that this subject should be taken up at once, first as a laboratory investigation, and afterwards industrially. Possibly it may be difficult in the absence of western facilities, but there is nothing that is not well-known to the Chemists of the Research Institute where difficulties as to experimental plant can probably be got over even in war time. It seems to me a matter of the first importance (*a*) as regards edible fats, (*b*) as regards the soap and candle industries.

(*a*) As regards *edible fats;* the butters consumed in this country are often of questionable origin and purity, and if genuine, are of a price prohibitive to all except the well-to-do. Yet "nut butters" in Europe are practically indistinguishable from animal butter, except in price; "Maypole" nut butter is sold at a profit at 6*d.* per lb. and the company in pre-war days was credited with dividends above 100 per cent. Hardened edible fats, which maintained complete freedom from rancidity though open on my office table for months, have been sent to me, and the same company intended to produce a ghee substitute in India but have been prevented by the war; other hardened edible fats, probably from cotton seed-oil have been offered to me at £14 per ton ex-factory in England. In this country we greatly need pure edible fats as ghee substitutes, and though oil is largely consumed, yet solid fats, such as shea and mowah butter and dupa fat, are desired and consumed; moreover instead of impure compounds called butter amongst the large butter consuming classes, solid and pure butter substitutes are most desirable.

So also such substitutes are needed in the nascent industry of preserves such as fish pastes and for biscuits and an existing chocolate manufacture. The cocoanut products which are the present substitute for culinary butter are quite imperfect, being fluid at warm temperatures and apt to retain or resume, especially when heated or slightly rancid after a tin has been exposed to the air, the peculiar cocoanut flavour. Now oils of fine edible quality but possessing both fluidity, colour, and specific flavour are by simple hydrogenation turned into white, solid, tasteless, and odourless fats but retaining the edible and digestible qualities of the original oils; these can be churned with milk, genuine butter, etc., and coloured and flavoured to represent butter in everything except origin, while for culinary purposes little need be added to the hardened fat; moreover the fats so treated become rancid with difficulty, and their original flavours do not return even when heated, the power of forming volatile acids having apparently been destroyed by the hydrogen. Since for edible purposes the melting point should not exceed blood heat, say 98° F, a very slight or moderate degree of hydrogenation is required, especially in the case of cocoanut oil which is a solid at a comparatively high temperature; this greatly reduces the cost, both by reason of time, wear and tear, and expenditure of hydrogen. One great advantage of hydrogenating in India, e.g., Madras, is that the oils can be obtained absolutely fresh and practically devoid of free fatty acids which are the bane of hydrogenators. With fine fresh edible oils at so high as say Rs. 450 per ton (average of cocoanut, ground nut and single refined cotton seed taken together), and hydrogenation at even £10 per ton, the cost of a butter substitute basis would be about Rs. 600 per ton or 4½ annas per lb.; hence the 6 anna price of "Maypole" butter may obtain in this country also instead of the high prices of genuine butter.

(*b*) *Technical fats.* The advantage here is two-fold; (1) the raising of the oleic group of acids to stearic, (2) the use of oils of cheap grade such as fish-oils, for soap, candles, etc. Most of the candles made in this country are made with imported stearic acid; this is always an unnecessary expense, and at present the want of the material is stopping manufacture, at all events in Madras. Kerosene oil and other oils notwithstanding, candles will always be largely used, and if cheaper their use would increase. Hence the production of stearic acid, which may be made of almost any titer and therefore very suitable for hot climates, will be very valuable. In soap making such hardened oil would entirely take the place of tallow—mainly used because of its stearic acid contents—enabling us to manufacture by either process and from cheap materials, thoroughly hard and solid soap absolutely free from animal fat and therefore particularly suited to Indian prejudices. As regards (2) viz., the use of cheap oils, the fact that thorough hydrogenation entirely and *permanently* removes the specific odours and colour of the oils, enables us to use, at all events for technical purposes, such oils as fish oils which are marketed at about Rs. 150 to 165 or £10 to £11 per ton. Hydrogenation (thorough) in America and Europe costs about £5 per ton; even if this cost is doubled for India, solid hard white stearine with only the odour of stearine (see specimens which will be produced) could be manufactured from fish oil and marketed at slightly over £20 per ton, which is elsewhere unapproachable; good tallow costs in normal times at least £30 per ton at home, and Rs. 450 to 500 is asked out here for inferior stuff. Besides fish oils the lower grades of vegetable oils at £20 per ton could be hardened and sold at below £30 per ton.

Hence I appeal for early experimental work in this important technical matter, which requires chemical knowledge, plant, and manipulative skill, and should therefore be experimentally dealt with at the Research Institute, Bangalore, without waiting for the proposed technological oil and fat bureau and experimental works proposed to be established there.

(34) *Celluloid.*—I mention this because of the usefulness of the material out here; possibly the Research Institute would take the matter up. It can be made in quite small factories: one which I saw in North Germany was comparatively insignificant.

(35) *The utilization of solar heat.*—This is not precisely an industry but a process, but I consider that it should be studied by experts since we are favoured (in this respect a favour) by large areas where there is a maximum of bright sun and dry heat. The smallest and crudest apparatus without mirrors or machinery gives remarkable temperatures suitable for industries requiring mere stoving or baking heat or cooking; this could be increased by simple means, while other arrangements would utilize the concentrated heat for evaporation steam raising, etc. This is obviously work for a mechanical expert The Californian, Egyptian and French (Sahara desert) experiments are most encouraging and Indian temperatures should increase the results. It is not expected—for obvious reasons—that this process will displace fuel-fired engines but the process should be studied and made available if only because its practicable uses will only then become known. I stove my lacquered tins in a solar oven without the slightest cost; I hope to apply it to evaporative methods in glycerine recovery, while it should be possible to use it for irrigational—perhaps with small storage—and other pumping where somewhat intermittent working is permissible.

(36) *Carpets.*—This seems an industry peculiarly suitable to this country, especially if agriculture develops better grades of wool. There is a foreign and even local demand for the woollen carpets (Ellore, etc.), so well and favourably known here; the industry is fairly simple and consonant with the habits and tastes of the people. At Killybegs in Donegal I saw a woollen " tuft " carpet factory quite recently started by Scotch manufacturers; the numerous girls at work were ordinary Irish fisher and other girls who, three or four years before, had never seen or heard of the industry, but their manipulative skill was marvellous and large contracts were on hand for hotels, etc., where the carpets were required to be artistic, comfortable, and durable. The advantage of the method is that so little machinery is required, there being no automatic plant and elaborate cards as in the Jacquard looms; the girls worked on the vertical frames direct from designs under the supervision of foremen experts.

The silk carpets or rugs of Tanjore district are well-known and the industry could be developed.

The carpet industry appears to me to have great power of development if taken up by organized effort and capital, coupled with proper advertisement in the Commercial Museums and in foreign markets (both through the consular departments of those countries and by our own consuls and commercial attachés and by agencies) and by regularized supply. No industry can flourish or develop where the answer to customers is, as is common in this woollen carpet industry, that there is no stock in hand and no chance of present acceptance of orders.

The above industries all seem to me to be not merely important and desirable, but necessary and easy of introduction—along with others—by a complete Industrial Department organized for serious work. But the growth of these and other industries depends largely on the growth and development of the greatest of industries, viz., agriculture.

I have not discussed industries which the Department of Industries or other official bodies are already investigating.

ORAL EVIDENCE, 2ND FEBRUARY 1917.

Sir F. H. Stewart.—*Q.* Could you tell us how long you have been busy with these fishery questions?—*A.* I began an investigation in 1905, but it was only taken up industrially in 1908.

Q. What is the organization and the staff of the Madras Fisheries Department?—*A*. Myself as the Director of the Department, Mr. H. C. Wilson * who is a pisciculturaI expert, English trained, who is engaged on the fresh waters of the Presidency, Mr. James Hornell, Marine Biologist, who is my marine assistant as well as biologist, Mr. Govindan, my Assistant Director, and a small subordinate staff. Mr. Wilson has trained an assistant now, an M.A. in Zoology, who will probably make a very valuable assistant as time goes on.

Q. How does the department obtain its funds?—*A*. There is a regular budget which is framed every September, and we work to that as nearly as possible.

Q You are in control of the whole department, and Mr. Wilson and Mr. Hornell are on special duty?—*A*. They take the two great branches ; I have general control, and also take as my particular share the West Coast experimental stations, the cannery, the curing yard, fish oil and guano works, and the soap works. They all come under me.

Q. And the routine work of the department is under your direction?—*A*. Yes, the whole of the general control is with me and all the financial control, and as you say, all the routine work comes through me and Mr. Govindan assists me in that matter especially in checking vouchers, etc.

Q. You quite approve of Government assistance in whatever way each particular case may indicate?—*A*. Yes, certainly.

Q. Besides dealing with the matters which were suggested, you suggest another method that is, relief, from the income-tax, for a certain time. You say, " It is not merely the impost itself but the fear or fact of mistaken assessment that operates." Can you give us a concrete case?—*A*. When I began the oil and guano industries I found that, roughly speaking, during that season I made 10 per cent of oil out of the fish and 20 per cent of guano. This I recorded in my report. A year or two after a large number of small factories started in imitation of our work, and the assessment officer promptly took my rates as general rates. It so happened that a year or two afterwards fish were rather scarce and people were not making anything like 10 per cent or 20 per cent of oil and guano, but fortunately the wise Collector who then was in charge of the district looked into the matter and remedied things.

Q. Otherwise these small people might have found themselves in a very serious position?—*A*. They might have had to pay a bigger tax than was warranted by their income. As I have said elsewhere, it is very often the fear of the income tax rather than the actual incidence of it that operates. In another part of my note I have said " the fear of income tax may be but a straw's weight, but it may just be the straw which decides against venturing on an unknown industry."

Q. Then you refer to the powers of Government under the Land Acquisition Act. Could those powers be used to give a title to land on which to establish a factory for instance?—*A*. I don't know whether the Act as it stands could do it ; all I recommended was that Government should have power to do that. I understand that they can take it up.

Q. But you think that if they cannot do so as the Act stands at present, that a modification might be made?—*A*. Certainly ; the two instances I gave I can supplement with a third one. I have been unable to take up factory land for the simple reason that they have in Malabar a tenancy difficulty. The land is held by landholders and is leased out for a period of years ; consequently if a factory is started and the lease is about to expire, the landlord can demand a very large fine or premium as a condition of the factory going on. I would have taken up a certain factory myself, but the lease was about to expire in three years' time, and if I put up a soap factory on a large scale, I might have had to pay many thousands of rupees as premium.

Q. You think Government experts should be trained in Government pioneer factories and then placed at the disposal of private concerns?—*A*. That is my idea and also my experience. I think I gave a direct example in the case of Japan.

Q. And the services of those experts would be paid for?—*A*. Certainly.

Q And what about the results of any investigations they may make?—*A*. I noticed that question, but have not thought it out, and can hardly give an answer to that. I will leave that to be judged by the Commission. As a rule, if those researches were of public importance, I certainly think they ought to be used. I think I said somewhere that the services of these experts should be availed of, even if they were trained as competitors to other people.

Q. With regard to co-operation, of which we know you are a passed master, you approve very much indeed of trying to establish the principle amongst all classes including the lower classes of industries?—*A*. More especially the lower classes as instanced by the fisher people on this coast.

Q. But we had some evidence from your Assistant Director which shows that the efforts in that direction were not so much to start regular co-operative societies but to start small associations for the purpose of encouraging thrift and saving a little money?—*A*. Yes, but I think that we have gone further than that. There is a co-operative society started near Tellicherry which is intended to bring people together for the purpose of establishing a curing yard under co-operative methods.

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* Mr. Wilson died in April 1917.

Q. Under co-operative credit methods?—*A*. No. Mr. Govindan has already established two co-operative societies for credit purposes. This is really an industrial society where people will join and obtain if possible from Government a closed curing yard in which co-operative members will join and carry on fishing and curing jointly. They have their fishing boats also.

Q. And the co-operation will also extend to the marketing?—*A*. Yes, they have their own boats. They will bring all their fish to the curing yard and will cure them there and sell the fish in bulk to merchants at the best price they can get.

Q. They will require a certain amount of capital to begin with?—*A*. One of the rules is that they shall pay monthly subscriptions until they have obtained at least 1,000, but I must tell you they have already got their boats and nets. The thousand rupees is for current expenses.

Mr. A. Chatterton.—*Q*. This will be like an Irish Co-operative dairy?—*A*. To a great extent. They bring all their catches to the one yard and deal with them there.

Sir F. H. Stewart.—*Q*. That question of commercial museums you have dealt with very fully, and you advocate something very much larger than what has been contemplated hitherto in India at all. That would mean very large initial expense?—*A*. It would.

Q. It would not repay itself for a very long time and never directly?—*A*. No, I don't suppose it would any more than the Japanese expenditure of 2 lakhs on the Panama Exhibition, but it comes in indirectly. Might I put in this paragraph from the last "Indian Trade Journal," quoting the "Board of Trade Journal" at home, and recent issues from the "Vienna Textile Times."

Q. Those are the lines on which you think development should take place here?—*A*. That is the second line where the work is carried into foreign countries.

Q. Have you thought at all generally what the expense of such an organization might be?—*A*. It did not occur to me to go into that question at all. I knew from my own experience in Japan that the expense was considerable, but it was not considered important in view of the results. We have to throw 6*d*. out of the window to get a shilling in at the door.

Q. You think that "a standing exhibition should be formed in the headquarter city of every presidency or province?—*A*. Certainly. I would start with a nucleus at each place, because Madras industries will be quite different from Bombay and Bengal, therefore each should have its particular commercial museum.

Q. And you would bring those under whose control—the department of Industries?—*A*. The department of Industries.

Q. Then you must contemplate a fairly large department of Industries?—*A*. Yes, I am afraid I have laid it down very widely.

Q. Then with regard to the purchase of stores, you think that the department of Industries might deal with the purchase of stores also?—*A*. For all general purposes. I am permitted by Government for all my experimental stations to purchase my stores direct, and I find it a very great convenience, both in time and otherwise. I get into touch with people at home, they sell me what I want and often at very considerable discount, and I don't go through the India Office at all.

Q. You think that that would be preferable to the present system of having a Stores Department at the India Office, or do you think it would be necessary to have that as well?—*A*. I have not had much experience of dealing with the India Office, but in the papers they say we cannot expect ordinary stores under six to eight months, and important stores under twelve. That is rather a serious delay, while I can get them usually in normal times in, say, three months.

Q. But were not the circumstances to which they were referring due to the war?—*A*. No.

Q. Then with reference to this department of Industries, where would you place the Director in the provincial hierarchy? In Madras, there is the Governor, the Members of the Executive Council and the Members of the Board of Revenue and the different Secretariats, where would your Director of Industries come in?—*A*. You mean what his status would be? I should say the same as the status of a Secretary to Government corresponding direct with Government, with nobody between him and Government.

Q. Then would he be under one of the Members of the Executive Council?—*A*. Yes, that is my own position as a matter of fact, and I think that the Director of Industries should at least be in a similar position.

Q. How would the funds you would require be provided, would you go to Government as occasion arose, or would you have a budget?—*A.* You would require a budget. We try to foresee as much as possible in the coming year what our wants are to be. There is always a lump sum put in, Government pass that budget and we work as close to that budget as possible.

Q. And very much of the work you would have to do and the expenditure you would incur would be unforeseen?—*A.* Yes, but not for a few months ahead. The exact amount is very often unforeseen, but probably the object is foreseen.

Q. The Director would have executive powers, according to your idea upto within the limit of his budget, i.e., a certain maximum, so for anything beyond that he would go to the Governor-in-Council?—*A.* The moment my budget is passed by Government I can spend that money on the object I have indicated. I don't go to Government again.

Q. Can you save, say, ten thousand rupees over one thing and put it to some other purpose?—*A.* I have to ask Government if I may transfer it.

Q. And you think that an Advisory Council would be useful?—*A.* Yes.

Q. Only advisory—not with powers?—*A.* Not with executive powers.

Q. And you would not recommend that the Director of Industries should merely be the mouthpiece, the Secretary and Executive Officer of the Advisory Board?—*A.* I think not ; not at present.

Q. And you think that the Advisory Board should be a standing committee, be permanent, or that it should be assembled from time to time? For instance, the Government or the Director as the case may be, may say, "Here is a case on which so and so would be a useful man to advise"?—*A.* The body may be permanent, but the personnel may differ from year to year. If any subject came up that Board would have power to co-opt other members who would have special knowledge.

Q. Would it be elected do you think, or be nominated?—*A.* Nominated at first certainly, I presume they would have power to co-opt other members.

Q. And as to the Director, you are quite clear that what is wanted is the best man available?—*A.* Yes, it may be an engineer or anyone, provided it was the best man at that particular juncture who is considered to be an all-round man for the place.

Q. Would it be feasible as has been suggested, to recruit a service, at any rate gradually, like the Customs, which might furnish these Directors and their assistants in time?—*A.* A Government department of Experts?

Q. They would not be experts. The idea is that you might catch your likely man young, and say, "Come along and join this service" and make that his work for all the time that he is in India. Do you think that something on those lines may be worked?—*A.* Then you would be dependent entirely on the men who happened to be in the service at the time, and would lose that one chance of getting the best man as an opportunist appointment.

Q. They would be trained and educated along set lines?—*A.* That would narrow your choice for any given opportunity. You must take it in that case from these men who have been trained.

Q. This question of Director is going to be a very important one, and he is not going to be a very easy man to find. Do you think you are likely to find him as need arises? He would have to be properly paid and highly placed?—*A.* I cannot give an opinion off-hand. I have not thought of that particular subject. I should say myself I am inclined to the idea of choosing the best man—whoever he may be, and not from a narrow service.

Q. It would be a provincial appointment?—*A.* Provincial undoubtedly.

Q. Would you have a Director-General at headquarters, or something of that sort, to co-ordinate?—*A.* Imperial? If I might speak from the fisheries point of view, I should say "No", except for purely scientific work, Geological Survey or Zoological Survey, or matters of that sort.

Q. That is rather a different question altogether?—*A.* That is so.

Q. You would welcome the creation or development of an Imperial Department of Science?—*A.* Yes, but looking at it from the industrial point of view, I should say that an Imperial Department is of less value than good provincial departments, and in the case of fisheries I should certainly say provincial only, except for zoological research.

Q. And there you would be quite glad to have an Imperial one?—*A.* Yes, because our waters are not limited by administrative boundaries.

Q. And you would just borrow the services of that expert whenever you require?—*A.* Yes, though I think myself that everything that is really important could be done by provincial officers who are necessarily far more acquainted with all the conditions of the waters than anyone else could be. If you take the rivers of this Presidency, a Bengal man could not possibly understand our rivers because for the greater part of the year our rivers and waters are dry. Our fishes are totally different in their bionomics just because of this.

Q. Turning to the question of adulteration, you approve of certificates of quality?—*A.* Yes.

Q. You think that these should be made compulsory?—*A.* If they are not made compulsory they would not be of much use, I am afraid.

Q. Most of the evidence we have had seems to be in favour of this but at any rate at the outset it might have to be voluntary?—*A.* Well, if I may take the question of soap; Sunlight soap does give a practical guarantee and sells enormously, although its prices are greater than those of other people who sell soap in the country of very inferior quality.

Q. With reference to manure, do you think that Government certificates of quality should apply to this?—*A.* You would have to have laboratories in that case.

Q. But supposing that sellers of manure were to publish Government analyses with their wares; would that help?—*A.* Yes.

Q. At present all sorts of deleterious and unworkable manures are being sold, but if a statement of contents certified to by Government had to be given with the manures, do you think that would do?—*A.* Yes, that is the practice at home; to give an analyst's certificate. I get mine from the Agricultural College and I believe that others do.

Q. I see that you are preparing a further memorandum which will be sent us on the development of fisheries?—*A.* My time is drawing near and it is a good time to look back on what has been done, and to prepare some indication to my successor as to how future work should probably be carried on. It is partly historical and partly suggestive showing how the work has been done and how we should proceed in future.

Q. About this cannery; that was essentially a pioneer factory?—*A.* Absolutely.

Q. You are now keeping it on as a demonstration concern?—*A.* Experimental. It is hardly a demonstration concern yet, though it is beginning to be.

Q. That point was not clear to me. You are not particularly anxious that it should be regarded as a demonstration factory, as you think perhaps the local fishery class is not sufficiently advanced?—*A.* Yes. I know one case in which they did come to grief in consequence of premature attempts to do canning work in Calicut.

Q. You also think that anyone who starts a canning industry should be in possession of fully sufficient capital, and be able to contemplate with equanimity a bad season or sequence of seasons?—*A.* He would have to do that. But as I have said we are really in the experimental stage. I am continually finding out new difficulties and methods and processes, and I am also canning new material. For instance, this year I have begun to can seer fish in slices. Then we are about to obtain a launch to bring in fish fresh from the sea to enable us to make not 50 thousand tins a year but 250 thousand. It is only then that it would be a commercial proposition.

Q. Is there any prejudice in this part of India against eating dried or cured fish?—*A.* No, they have always done it.

Q. Do you know about other parts of India?—*A.* On the North-east coast of this presidency they won't touch shark or porpoise, while here (West Coast) every part of the shark or porpoise is eaten; consequently the fish of that class which is caught on the North-East coast goes over to Rangoon or is thrown away.

Mr. A. Chatterton.—*Q.* In that particular connection what becomes of the theory that salt fish produces leprosy?—*A.* It has been decided by a medical committee in Norway that there is absolutely no evidence on that point; it may produce other complaints. I believe myself that bad fish is productive of complaints which often simulate cholera.

Mr. C. E. Low.—*Q.* With reference to section I of your written statements, was there any direct financial aid in the way of loans or subsidies in Ireland?—*A.* Yes, they put very large funds at their disposal; for instance, the whole of the Kensington grant was handed over to them, the whole of certain funds amounting to £250,000 per annum.

Q. Was that for the pay of experts, or was there any direct financial aid in the way of loans?—*A.* I don't quite catch your meaning.

Q. They were helped one knows by lending them people to teach them various industries, and by providing them with nets and boats, etc.?—*A.* That was the Congested District Board. That Board started in 1889, and worked very largely in a beneficiary way. After that there came the Irish Department which was formed in 1898, in which very large departments embracing agriculture, fisheries and other industries were formed independently altogether of the Congested District Boards and were very largely financed by Government.

Q. Did they hand out actual cash to any of these people engaged in these industries?—*A.* You mean the Congested District Boards?

Q. Or any Government department concerned?—*A.* I cannot at the present moment say. I know they lent money for motors and boats, but whether they *gave* it I cannot say. They did actually lend cash for that purpose as well as for building boats and piers, etc. It is something similar to the Development [illegible] England. When I was down in Cornwall there were large sums being [illegible] voted as grants-in-aid for the purpose of providing motors to the fishing boats.

Q. There is more or less of a soap industry in Northern India?—*A.* Yes, the North-Western Soap Company and one or two others.

Q. But down here there is nothing?—*A.* There are one or two men who have started with a washhand basin or so. There have been one or two attempts. For instance, in 1902 there was a soap factory at Madura where they had got an expert, a German, I believe. There were disputes between the expert and the Directors, and after they had made 70 tons of soap the thing fizzled out.

Q. Fish oil has not been touched by anybody as a basis for soap?—*A.* Yes, we began that way.

Q. I mean not by anybody here?—*A.* There was originally no fish oil that could be made into it. The fish oil originally was made by putting the fish into large vessels and allowing it to putrify. Then the oil was skimmed off and put into tins and utilised in various ways though not for soap, but it was very unpleasant material.

Q. With reference to the question of Government pioneering, have you any suggestions for preventing such factories from competing with other factories which have been started by private agencies?—*A.* The question has not arisen. I have not therefore considered the point. I am quite friendly with the only other cannery on the place and they visit my cannery and elicit my views and see my methods.

Q. That is because they are away down on the Coast?—*A.* Yes.

Q. Supposing one started quite close to where you are, how would undesirable competition by Government agency be avoided?—*A.* For one thing I might hand over my products to them. That would be one way out of it.

Q. Do you think they would undertake to market the products?—*A.* Yes, because they would know that my products were at least as good as any in the market.

Q. You state regarding industrial surveys, that you "consider that future surveys should be individual and not general." I suppose a corrollary of that would be that the survey must be made by an expert?—*A.* Undoubtedly.

Q. Do you think that these sorts of general surveys serve any use?—*A.* As a foundation.

Q. But they have all been done fully ; every province has undergone one?—*A.* There are many things which I have mentioned in my note which have not been even generally surveyed, except in a most vague way.

Q. Do you think any of these surveys are of any use?—*A.* Only as introductory to an expert survey.

Q. Could that not be done more easily without any survey of that sort by looking at the Gazetteer or consulting sources of information well known to everybody?—*A.* I don't think any Gazetteer would tell them much, say, about the bangle glass industry.

Q. You would find in the census report the number of people dealing with it?—*A.* That is about all you would find, but a general examination by a Government official who would take up the points I have mentioned with regard to bangle glass, would enable Government to say whether that particular industry should be taken up by a man who would give his sole attention to it.

Q. You think there should be a committee of business men to advise as to the line on which industrial museums should be run?—*A.* Yes, that would be a part of the Advisory Committee's work.

Q. When you come to the question of commercial intelligence, have you considered any scheme for commercial intelligence work over India as a whole?—*A.* No, that was rather outside my purview. This is rather beyond the scope of my own work. I only put down what I happened to know about commercial museums.

Q. I mean would you not be inclined to separate commerce from industry at any rate in a province like Bengal or Bombay if not in Madras? Don't you think you want one kind of man to make up industrial information, and another for commercial information?—*A.* My view generally is that of an industrial museum ; you may call it ; commercial, but I have dealt with it rather as an industrial museum.

Q. Do you think that there is a case for general organisation for commercial intelligence in the country? If you do not care to take on the question at such short notice, I will not press it?—*A.* I don't feel able to answer the question straight away. I have not thought of that point, but commerce is so bound up with industry, that I don't see how they can be absolutely separated. If I may just give one illustration of the actual combination in the case of oils; here, for instance, everything on the commercial side depends upon the industrial character of the oil. Supposing a quantity of oil is dealt with commercially and sent to England. It turns out to be not what it was thought, because no industrial expert had previously pronounced upon it. It turns out to be comparatively worthless stuff and is sold for soap [illegible] oil for edible purposes. There is a case where the commercial and the industrial sides are absolutely bound up. The article would never have been sent abroad, had it been first examined industrially by industrial experts.

Q. Take the case of the United Kingdom. The Commercial Intelligence department of the Board of Trade act solely as a Commercial Intelligence Department. The case is different here. There their great business is to bring buyer and seller together, or the would-be buyer or the would-be seller, to show how different kinds of things made in Germany before could now be made in England ; but in this country we require an Industrial Department as well?—*A.* We do undoubtedly. Have they not just united the Imperial Institute with the Board of Trade which looks as if they were combining the two.

Q. Do you attach value to some degree of education as improving the efficiency of even unskilled labour?—*A.* Undoubtedly.

Q. Do you think it makes them more efficient?—*A.* Yes, I have seen it myself. I can say positively that those of my men who have had even a degree of instruction are able to understand and carry out processes more intelligently than if their minds were absolutely blank on matters even of reading and writing. Their intellect has been sharpened and widened.

Q. We are confronted with the cry that the people don't want to earn more money and no doubt in a very great number of cases that must certainly be the case. It has been suggested to us by many that an increase in the standard of comfort will make them have the desire to earn more. Do you think that the solution of this lies on those lines?—*A.* Yes, in this way. If you give a man a chance he will very often take it. If he has no chance of being prosperous, everything goes to the dogs. Here the fishermen had no chance of saving. When they got a big haul they spent their money anyhow, but if co-operative societies are formed, we know that they will put their money into those societies until they have amassed so much money.

Q. You have more or less deliberately chosen a sort of saving society rather than a co-operative credit or borrowing society to start with?—*A.* It is because the people themselves were so unthrifty. Their income is a very uncertain one. When they got a big haul of Rs. 20 or 30 a day, they were very apt to spend it carelessly, and wise people on the coast saw this and endeavoured to wean the people into better ways by teaching them thrift and temperance, and as a matter of fact they so well succeeded in one society that the young men had saved money to the extent of Rs. 700 entirely out of money which had they followed their ancestral customs, would have been spent on drink.

Q. You recognise that progress in that way is likely to be less rapid than progress by putting them in touch with a central bank and instructing them to add to their earnings by improved appliances?—*A.* I don't think I could speak as to banks. I don't think it possible that the banks could take up this question. I think at present it depends rather on Government takavi.

Q. You don't think that a central co-operative bank would be justified in touching this kind of business at this stage?—*A.* I don't think they would, because though the property that would be obtained by means of such dealings would be tangible property, such as boats and nets, on the other hand the business is risky and the banks would not want to take up such venturesome business.

Q. As you are no doubt aware, the central co-operative banks err on the side of over-caution in most provinces?—*A.* Yes, that is one reason why I think loans from Government are probably the way in which we shall begin to help the fishermen in the way of boats, as is done in Ireland. I take Ireland as my guide.

Q. What is your view as to these men who are sent abroad to learn. You say they should be men who have already worked at their specific industries. Do you think it is desirable to prescribe some period of further apprenticeship in this country?—*A.* It depends so much on the men and their previous training. If the man was already a well-trained man and merely widened his knowledge by going abroad, as in the case of my Assistant Director, he can take up his position as before and no further training would be required.

Q. In so many cases they send men abroad who have a very sketchy idea before they leave the country, and in some cases none at all?—*A.* Yes, and that is a great mistake. When I was in Japan I met a lot of young fellows who had come there, and it is a positive fact that when I asked two young men of a new batch what they had come for, they were not able to tell me, and a voice from behind prompted one of them to say, "Weaving". I have consequently said in my note that men should be sent out with some previous knowledge, and for a definite purpose.

Hon'ble Sir R. N. Mookerjee.—*Q.* Do you remember whether they were Bengalis or not?—*A.* I cannot say; I was in touch with the men who were studying, but these were newcomers.

Mr. C. E. Low.—*Q.* You speak of " real experts ", by which I understand you mean that they must be specialised experts. Would you accept this point of view that when you are starting an industry for the first time, you are up against a very tough job and you should therefore have no less specialised staff than that of the people against whom you are competing?—*A.* Yes, you must have an expert manager, not merely a foreman.

Q. You might need more than one expert?—*A.* Yes, in some cases it is necessary. A foreman is of no use for dealing, say, with fisheries out here, because he is up against conditions of which he has no knowledge at home. You want more highly trained men.

Q. Don't you think that Government have very often discredited themselves and the cause of industrial progress generally by taking on a job without sufficient expert assistance?—*A.* I have not sufficient knowledge to say that. There might be some cases though I don't know them personally. I had to educate myself, for instance.

Q. Don't you think that Government has to do with this kind of thing ; a lot of glass is imported into this country, and they write to the Secretary of State and say, " Send us a glass expert ", but don't specialise as to what sort of glass expert, yet you probably have experts for different kinds of glass?—*A.* Yes, no doubt.

Q Don't you think that is rather a dangerous way of starting with what I call a semi-expert, without sufficient detailed expert knowledge to carry on the industry?—*A* You are pre-supposing that he is only a semi-expert.

Q. He is probably entirely an expert in one portion of the glass industry, and he knows a little about the rest of the thing. You expect him to take on some portion of the glass industry of which he is a semi-expert?—*A.* Yes. For instance, I should not dream of putting a trawler captain in charge of a curing yard.

Q. You say that there is no general principle as to what class the Directors should be drawn from. It has been suggested to us elsewhere that especially in cases where the Director is an official, it would be a good thing to have a Deputy Director assisting who should be a business man himself?—*A.* Very likely, yes. If he is a first-class business man do you think he would come?

Q. Quite so, that is the difficulty in any case, and perhaps greater in the case of the Deputy Director than the Director ; but we have to consider the point?—*A.* In commerce I confess I do not think that they have better business instruction. They might however have better business training as regards pounds, shillings and pence—accounts—for instance.

Sir F. H. Stewart.—*Q.* Would an optional system of Government certificates of quality work possibly in the case of exports and imports?—*A.* I would prefer that they should be compulsory myself, because of the extreme ignorance of the people in purchasing imported and other goods, and if I may give a case in point, I would say that, taking soap as an instance, it is perfectly easy to put on the market a soap which is not worth Rs. 10 per cwt., and to sell it as though it were worth Rs. 20.

Q. You mention the idea of loans to small manufacturers for the provision of plant. You realise I suppose that that might go to enormous sums of money. It might be carried to any possible length, and if so, one would have to consider the financial aspects of it to some extent. Would you put any limitation in practice on that policy?—*A.* Would it in practice require limiting? Would it be likely to go to enormous sums? I don't think there would be any industries in this country that would so develop that there would be any large sums out at any given moment.

Q. The spread of rice mills in the Delta seems to be very rapid?—*A.* And their competition is affording its own remedy. There are too many of them. Would the Director of Industries be inclined to give any help where he saw these mills were exceeding the natural limit?

Q. The complaint against the Government by the representatives of industry was for helping them to get plant which was the cause of this competition.

Mr. A. Chatterton.—Attention was drawn to that five years ago, and the department withdrew from helping these people, and they went on on their own account.

Sir D. J. Tata.—*Q.* You refer to certain questions about Japan and Germany in your written evidence especially about their museums. May I ask what has been your personal experience of these places? Have you visited them and studied the questions on the spot?—*A.* Yes. My note is based on my own inspections

Q. How long were you in Japan?—*A.* Ten weeks.

Q. You went over especially to study?—*A.* I went over to study fisheries and being there I naturally looked into agriculture in which I was very much interested and naturally also into the development of industries which I saw under my own eyes, and the industrial museum in Tokyo attracted my attention. I was there on a number of occasions.

Q. Did you go especially to Germany to study museums there?—*A*. No. It was an accident. I went to study co-operative credit and naturally I gravitated to some of these interesting places. When I first went it was a small place in old barracks, and I obtained books on the subject, and the next time I went a few years afterwards, it had greatly developed.

Q. All these things must have cost a lot of money. How do you propose that this money should be found in this country?—*A*. As I said, I think it is worth while to throw six pence out of the window to get a shilling back by the door. But the expenditure would be gradual, spread over many years.

Q. Do you think municipal and local bodies may be asked to co-operate in some way?—*A*. In local museums it is the rule that local bodies should contribute, both in Germany and Japan.

Q. While in Calcutta, we heard something about deep-sea fishing experiments. Does your department know anything about the experiments that were made in the Bay of Bengal?—*A*. Only by hearsay.

Q. Deep-sea fishing has nothing to do with your work?—*A*. Not at the present moment. It is only developing; an industry which we are now about to proceed with. It would have begun here but for the fact of the war. When I was at home in 1914 I went especially to select a master fisherman and mate to take up the question of deep-sea exploration. The men were actually selected, but only on account of the war I was not able to get them as they were mine sweeping. In August, when I left the country the men were actually engaged in practical mine sweeping. In addition to that, the Madras Government contemplate a large vessel which should be a trawler-drifter. It was to be built somewhat on the lines of a destroyer with a forecastle rather elevated under which the scientists would have their housing, while everything aft of that would be devoted to the actual fishing business. This vessel was designed and we sent home to the India Stores Department for the design to be criticised and they had sent us their views and also an estimate for the boat; we should probably have built and had it at work but for the war. We have not been able to take up this deep sea work because we have no boats. When I tried to develop that branch there were no sailing boats for the purpose and I found that unless the boats were big enough to take a European expert out with them it was no use. The men could not work new methods in the way trained master fishermen could have done, and therefore we have had to wait until we can get both the boats and the master fishermen.

Q. You did not bring out any trawling nets to make experiments with?—*A*. That would be of no use without the trawler. It is necessary to have big boats for exploration work. When we have discovered and examined trawling grounds we can start this and can then induce the people to take up sailing trawling. When I was in England there were many sailing trawlers in existence. A steamer is not necessary for trawling.

Q. To go back to another question, with reference to your reply to Mr. Low, don't you think that the improvidence and want of ambition in our people are the real things that stand in the way of their industrial advancement?—*A*. It is an obstacle no doubt. If a man has no particular hope or ability to raise himself, he won't trouble to try to do so.

Q. The real question underlying the whole thing is therefore, education, to inculcate in them provident habits?—*A*. If you use education in a very wide sense undoubtedly.

Q. From what little experience I have had, I find work people do not desire to obtain higher wages, if they have to exert themselves a little more to gain them?—*A*. Yes.

Q. They are quite content to keep themselves going, and if by chance they come across a windfall of some kind, their sole ambition seems to be to build up more imposing houses and make some sort of display?—*A*. I do not think that is quite the case here. We have actual instances of many men who have gone up in the world when they got a chance of so doing. Many of the people in our fish yard have obtained considerable fortunes by their methods. It is true they were more commercial men than fisher men but they were persons who seeing the opportunity of doing better did better and the 250 oil and guano factories that I have mentioned are cases in point. Many of those people are ordinary fishermen without education, but when they saw results which showed that they could obtain a considerable amount of money with a very simple process they took it.

Q. In Gujarat the ambition of every man is to improve the family house, and make it a choicer thing than the original hut?—*A*. Yes; a fairly laudable thing. If he has nothing to put his money into why not put it into the house? These people have put their money into a factory.

Q. Turning to Museums again, I suppose the Stuttgart Museum is partly Government and partly municipal?—*A*. Yes. The Museum was the outcome of the efforts of Dr. Von Steinbeis who was Director of Industries.

Q. Referring to section VI of your note I presume by what you state, that you advocate the encouragement of municipal co-operation in the development of industries?—*A.* What I am alluding to there is the advisory board which was composed of two members from every county. They formed the nucleus and sixty out of the hundred and four members were appointed direct by the Government.

Mr. A. Chatterton.—*Q.* Does this Board meet more than once a year?—*A.* I cannot tell you. They are bound to meet once a year, but whether more I cannot tell you. They are, of course, open to consultation in the case of individual members.

Sir D. J. Tata.—*Q.* In regard to the list of industries that you give—and with particular reference to umbrella making, may I just suggest that when I was in the Nilgiris I saw there was a large trade in sticks there. It struck me then that if omebody knew how to prepare the sticks, we would make a good trade in sticks and umbrellas?—*A.* Yes. When you go to Coimbatore you will find men selling a arge number of these sticks.

Q. You say something about the making of jams and preserves?—*A.* I followed Gladstone.

Q. I believe during the war there is a tremendous amount of jam being sent to Mesopotamia. You advocate that these things should be made in the country?—*A.* Yes.

Hon'ble Sir R. N. Mookerjee.—They are now being made in Muzaffarpur.

Sir D. J. Tata.—*Q.* Down south a good trade could be done in guava jelly. On our side there is the karvanda and various other cheap fruit Could anything be done systematically to develop these things?—*A.* Undoubtedly. At present, down here, it is practically a domestic industry only ; and I have suggested that in the cannery where I make my own tins, it might be possible to start the nucleus of a preserved food industry. I am already making preserved foods from fish and it would be quite possible to add others.

Q. Up in the north, there is a lot of fruit which cannot reach the plains for want of transport. If some of that were converted into jam would there not be a fairly good trade?—*A.* I have seen loquats lying waste under the trees literally by the ton on the Shevaroy hills. If there was any industry of that kind it could be taken up.

Q. Then, with reference to lace some years ago, we had in Bombay an industrial exhibition in connection with the Indian National Congress ; and from the south we had several missionary ladies who exhibited laces which were really as good as any you could import. Why was not that developed further?—*A.* It is being developed very largely. When I first came to this country there was no lace made but at Nagercoil a missionary lady who did not even know lace making took a piece of lace to pieces and put it together again, and taught the women there. There is now a regular business in it, both there and at many other centres.

Q. There is something made I am told equal to the best Belgian lace?—*A.* Yes, there is a Roman Catholic Mission in Madras which makes this lace. It is equal to the best Irish lace. In every case you will find that it is connected with missionary work.

Q. Could not some of that work be introduced into our girls' schools?—*A.* Certainly In the Basel Mission you will find beautiful drawn-thread work done.

Q. With reference to your remark about the utilisation of solar heat ; you say you have used it yourself. Can you tell us how exactly?—*A.* It was a shallow teak box blackened inside, provided with a double glass sash on the top and inserted in another box with saw dust round it. That was exposed to the sun. The maximum temperature I had was 275 degrees which was exactly the heat I wanted for lacquering my tins.

Mr. C. E. Low.—*Q.* Can you regulate the heat?—*A.* Undoubtedly ; you have only to turn it slightly away.

Sir D. J. Tata.—*Q.* I believe there are regular companies which sell apparatus for collecting solar heat. I have seen one advertised in the Scientific American?—*A.* Those are aeromotors.

Q. No, they are apparatus for collecting solar heat, hollow, like the reflector of a lamp, on which the beams of the sun are collected and thrown on one point. We got one ; and I understand they are now being used in Egypt?—*A.* There were considerable experiments in Egypt It was found, however, that the plant cost twice as much as a steam engine. It was a question whether it was better to spend a large sum of money in plant, or put up an ordinary steam engine at half the cost and run it in the usual way, because the steam engine has great advantages in many ways.

Hon'ble Sir R. N. Mookerjee.—*Q.* What is your annual budget for the [illegible]?—*A.* At present I think it is one lakh and sixty-five thousand. That includes the [illegible] and chank fishery.

Q. What is the total income?—*A.* The total receipts were Rs. 78,500.

Q. Then it means that practically the annual loss to the Government is about 70,000?—*A.* The Government expenditure ; that includes the pay of several European and other experts.

Q. In your opinion do you think the money is well expended and that the Government should incur such expenditure?—*A.* I think so. As I have said in my report, in a very short time the thing will be self-supporting.

Q. You think that very soon the effect will be known, and that Government would not be a loser in any sense of the word?—*A.* Yes.

Q. Don't you think that Government ought to have the right to nominate a Director on companies or factories to which they had advanced money?—*A.* I don't think I would like an outside Director interfering with me.

Q. He would be one of five or one of six?—*A.* You mean that there should be a person appointed by Government to sit on the Board and see that the Company was doing its work properly? I think I have said pretty plainly that I should be against any Government interference other than that which went to see that the money was being spent in the way that it was intended. That could be done by auditors.

Q. The auditor comes in after the thing has happened, when probably the mischiet is done?—*A.* Does not that rather presuppose that nobody has paid any particular attention to the person to whom the money was given?

Q. Bring yourself in the position of a shareholder. If you subscribe a large share you would naturally want to put some one you trust, therefore Government should have the right to see that everything is properly done?—*A.* But the shareholder has to trust his Directors, and I don't see why the Government should not also trust the Director to whom they have only advanced money after very careful investigation.

Q. The shareholder has a voice in electing the Directors?—*A.* Not very much.

Q. If I buy a share I vote and get my own Directors?—*A.* But 9 people out of 10 don't.

Q. But all the same they have the right to nominate the Directors. It would not be fair that Government after taking large financial share should have no voice in electing the Director ?—*A.* I think I have said pretty plainly that when they have once made up their mind that the beneficiary is worth lending money to, they should lend it and use little interference in the working of the factory.

Q. Apart from fisheries, have you given a thought how other industries should best be financed. We have before us industrial banks ; have you given any thought to that?—*A.* I have not. I saw a good deal of it in Japan ; how the industrial banks were giving loans to industrial bodies ; but I know nothing of the details, and have given no thought to the matter. I have merely gone into the question in connection with my own fisheries.

Sir F. H. Stewart.—*Q.* About the Fisheries Department, do you think that that is organised as you would wish it to be organised?—*A.* No, it began haphazard, with myself and a couple of clerks, and we have added from time to time in an opportunist fashion men who happened to be available. It is not a department which has been really thought out and organised.

Q. For instance, how are the commercial propositions handled, the collection of fishes for export, marketing, etc.?—*A.* There are several plans. Some people buy direct in parcels from us. Take the Tanur fishery yard, we have a considerable business in sending parcels from there ; we also started a store in the Madras market. It was so successful that the man has now gone on and is a large customer of mine. I have started a similar one in Bangalore, and we are now about to let him go on and start on his own account. That is as regards fishery matters. As regards soap, we are just evolving a plan for the sale of the goods.

Mr. A. Chatterton.—*Q.* About the Museum at Stuttgart, I happen to have seen that Museum, and got some information as to what it cost. It was something like 300 thousand pounds. Some time ago I had to prepare an estimate for a similar museum in Bangalore, which ran into fifteen or twenty lakhs of rupees, and I recommended that the idea should be abandoned because I thought that 15 or 20 lakhs in the present time would be more advantageously spent in other ways in industrial development. The time had hardly arrived when we could properly make use of such an expensive museum?—*A.* That pre-supposes that we should spend the whole money right away, whereas in all these cases it has been slow and steady development. In 1906 in Japan there were only twenty thousand samples, now there are seventy thousand. The buildings in Japan were very kutcha, as compared with the Technological Museum at Stuttgart.

Q. How would you get over the difficulty that museums would get out of date very rapidly. If you equipped it in any one section, in five years it would become a museum of antiquities?—*A*. Even then it had its uses as showing what was done in the past.

Q. In Germany you have a thousand people who will visit the museum for practical purposes, to one here?—*A*. After all, the museum to a great extent made the thousand people come, because it was there, and there was nothing of the sort before to instruct the people. It began with a few samples from the 1851 exhibition.

Q. The 1851 exhibition started the whole of the industrial development in Wurttemberg. You are strongly in favour of pioneer industries when necessary. There are two ways in which this may be done ; one is that an officer under Government, such as the Director of Industries, or the Director of Fisheries, might pioneer an industry or that after preliminary investigations have been made the pioneering might be entrusted to private firms. Dealing with the first one, do you think that it is practicable to pioneer industries which are likely to develop into big commercial transactions, with existing methods of control which Government employ? Have you ever had much trouble with Government control of the commercial side of these fishing things?—*A*. If you give me a concrete case, I shall try to answer.

Q. For instance, in the control of your establishment, if you carry on pioneer work, you must have perfect liberty to employ men when you require them, and dismiss them when you do not want them. Under ordinary rules you cannot do that?—*A*. My staff is largely temporary, but I have two or three permanent men, and there is that difficulty as regards the permanent men that you speak of, if they did not suit me, it would be difficult to get rid of them.

Q. We have to consider whether we should advise Government to undertake pioneering industries. There are several industries to be dealt with, and it would be rather difficult if we did not get control of our staff. Do you think it would be necessary for us to make a recommendation to Government that new methods of control or a great relaxation of the present methods of control would be necessary?—*A*. I think it advisable that men considered unsatisfactory should be got rid of.

Q. That we should give the Director the same powers as the managing director of a private company?—*A*. Yes.

Q. Do you think it would be still better not to attempt to carry out these things under Government supervision at all, but to do it through private firms who have facilities for starting such work? Supposing you wanted to start an enamelled iron factory, as a pioneer industry, would you go to a firm already engaged in sheet-metal work and endeavour to interest them in the matter?—*A*. I would much prefer that.

Q. You would prefer that it should be done through a private firm?—*A*. If any firm showed the least inclination to take it up.

Q. I gather from your note that you are rather in favour of starting industries on a comparatively small scale. I have drawn this inference from your remarks about the possibility of establishing a considerable number of comparatively small soap works, who would enter into combines for the collection of the crude glycerine?—*A*. That would be one way, but I think that the oil and fat industries should be undertaken on a large scale.

Q. Did you see any of that when you were in Japan, did you make enquiries at all on the industrial side of Japanese industries?—*A*. No, I was not there for that. It was merely incidental. I do know by hearsay that in Germany and Russia the small soap factories are extremely successful. In Russia in one province there were 47 factories with 160 odd artisans, i.e., 3 men to a factory, and the product was annually a few thousand lb. They were doing exactly what I thought might be done here, and as a matter of fact there are one or two men doing it in one or two places in what I may call a wash-hand basin.

Q. Is it justifiable for us to encourage development along those lines, and definitely undertake the provision of central factories?—*A*. I don't think I have said that.

Q. I am asking you if you think it is a proper policy to pursue. For instance to go back to your soap, you say that in Russia there are a number of small soap factories established, and we might encourage the same here, but to make them efficient, some one will have to start this glycerine factory. Should that be a function of Government, to start a central factory for the manufacture of glycerine from the by-products of a small soap factory?—*A*. Yes, the glycerine from soap would be sent to the refinery, which these petty soap factories could not deal with.

Q. Do you think that a similar method of procedure might be done with the handloom weaving ; that Government might set up central warping mills?—*A*. Yes. I advocated this a number of years ago, because it was carried out in the [illegible] and I thought it was an admirable chance for improving the warps and [illegible] expediting work, and setting free a large quantity of labour at present [illegible] these warps.

Sir Frederick Nicholson.

Q. In connection with your remarks on weaving, I notice you have said that you did not think anything very much had been done in consequence of such efforts as Government have made?—A. I said comparatively little advance had been made in improving the industry generally. Out of the three hundred thousand looms, I don't think there are many fly-shuttle looms.

Q. We were told in Madras that of those country looms one hundred thousand have been converted into fly-shuttle looms?—A. I really don't think so. What little I have seen of them would not warrant me in thinking so.

Q. I don't think you have dealt with it in your note, but I would like to ask you about the financing of cottage industries, and the development of mechanical aids to industry. I think you will agree that one of the pressing necessities all over India is the encouragement in the use of machinery as a substitute for manual labour. You know the system that has been developed of giving takavi loans and supplying machinery on the hire-purchase system. Do you generally approve of that as a method of giving help to people?—A. That is the only part of it I have any knowledge of, viz., takavi, but I know nothing of the rest.

Q. Would you object to a man who has sunk a well being supplied with machinery to take out the water?—A. Certainly not; after all if you give a man a cup of soup you may lend him a spoon to take it out with.

Q. These notes which you have given to us on industries are very interesting, and they are put forward more or less as suggestions?—A. Yes, merely as thoughts that had occurred to me from time to time.

Sir F. H. Stewart.—Q. You would not care to go into them in any detail?—A. No.

Mr. A. Chatterton.—Q. You suggest the manufacture of toys. Toys are made in many places already. How would you get over this sort of difficulty. You start men on making toys, but there is an absolute lack of imagination on the part of these workmen which prevents them from doing anything of use?—A. That is why I suggested giving them experts. I think that was the case in Germany, the work was carried on under a certain amount of technical instruction and expert organisation. I remember in the days of my childhood the conventional Noah's Ark; I think nowadays toys have become quite a different proposition.

Q. You think a certain amount of imagination must have been developed?—A. Yes, and also there has been a critical demand for better and better toys. I was very contented as a child with little tin steam engines which I used to drag about with a string, but the modern child would not be content with that, he would want a self-running clock-work motor-car. The toy business has developed partly by better instruction of the toy makers, and partly by the demand for higher class goods.

Q. This would probably be an industry which would have very great development in missionary industrial schools?—A. Yes.

Q. In regard to what you say about lace, it has been a mission industry so far, almost entirely. Is there not likely to be an extremely limited market, if you develop it at all?—A. I am told that in America there is an absolutely illimitable demand for handmade lace, and if you succeeded in opening shops and supplying them continuously, there would be no lack of demand.

Q. I was told the same sort of thing but when we put it to practical test, it did not hold water for a minute?—A. One swallow does not make a summer, and more tests might be made.

Q. One industry is lock making in Dindigul. There are two difficulties that have always occurred in connection with locks and safes, one is that when you get a safe you were not certain of getting all the keys, and the other is that you can never be quite certain that the locks that are manufactured will be like the sample ordered. Do you think it would be a good thing to introduce any kind of Government inspection into industries of that kind, where the locks would be manufactured by the firm in question and then submitted to an expert for examination and passed before they were put on the market. They would be given a kind of certificate?—A. I believe Government do that for their own locks.

Q. Supposing that were done for the public, you would then be able to go and buy country-made locks with the confidence that it was a useful article?—A. Yes, just as you buy a barrel of herrings with a Scotch Crown brand on it. The trouble here is that the man makes the locks as a family or house business and wants to charge the same price as you would pay for a Chubbs' lock.

Q. You have also suggested extract of essential oils and the manufacture of drugs. Have you ever considered the possibility of developing the growth of plants which yield drugs?—A. That was my point. I was thinking of essential oils and perfumes.

Q. Would it be practicable in hill stations like the Shevaroys to start small gardens [illegible] managed by people who have settled up there?—A. That was precisely [illegible] [illegible] the case of winter-green. It grows very largely and readily [illegible]

Nilgiris. My idea was that people settled there may grow it and have their stills on the spot. As a matter of fact I know a gentleman who has made a business out of this.

Q. Do you think there would be a sufficiently large class of people to make it worth while pioneering?—*A.* I think so. I had an idea that I might take it up myself after I retire from the fishery business ; to pioneer it I mean ; e.g., as oranges and citrus fruit readily grow there, I think we might get essential oils from them.

Q. How are we to get over this difficulty. For instance you say that at the present moment you can get oranges for nothing, but if you set up a factory and start on a commercial scale, you might find that they are not to be had in such quantities?—*A.* That is why plantation would be necessary. Take Sweet Verbena, that would require to be planted.

Q. It is obvious that a certain amount of Government help would be required in starting these things. Would it be desirable to have subsidised farms—small gardens?—*A.* I think I gave that as my idea where I said that supposing it was considered desirable to start an industry of essential oils, it might be advisable after securing the proper person to advance to him the money to start.

Q. Supposing you did it for the first person ; it might fail. He might take it up and grow one or ten acres, quite insufficient to start an industry. What you might perhaps want would be 500 acres taken up, and in the earlier stages subsidised?—*A.* I don't think myself if it was done successfully it would require assistance by Government, even in the case of 10 or 15 acres. I think it could be taken up even on a small farm of 5 or 10 acres.

Q. At the present time, even within a comparatively short time, you are able to manufacture aluminium in the country, and is it desirable that Government should encourage the manufacture of a possibly inferior kind of metal work simply because it is cheap?—*A.* If one is quite sure about the subsequent development of alloys I would quite agree, but when I look round the bazaars and houses and everywhere and see the quantity of enamelled ware that there is in existence, it seems to me that it is a business that has come to stay. However much alloy or aluminium industry may develop, enamelled iron will probably always be cheaper. It is nasty, I fully admit.

Q. Before the war, there is no doubt that enamelled iron ware was more expensive than aluminium for most practical purposes?—*A.* Was it?

Q. And assuming at any rate that there are these possible developments, you do not think that we ought to discriminate to a certain extent and keep back or not encourage an industry like enamelled iron ware?—*A.* Certainly, if there is a probability of a better class of goods ousting enamelled ware, I would at once plump for it.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* About this factory, why do you not turn it into a demonstration factory? Why not teach people?—*A.* That is what I hope.

Q. But you are not doing it at present?—*A.* No. We have, as a matter of fact, taught two or three young men, but at present, as I say, we are only really in the experimental stage and it is fatal to teach people work until you are quite sure of every step in the process. May I point out that one or two gentlemen visited my factory on previous occasions and thought the matter was so easy that one of them took it up and lost his whole savings on it.

Q. You are not in favour of big capitalists coming out and forming a company and taking up fishery work?—*A.* No, not as regards actual fishing.

Q. What about the other fisheries here?—*A.* I do not say that they will be developed at once, but that is what we shall probably come to. When we begin to exploit the deep sea, there will have to be ports where boats will come into ; now there are only a few ports in the West Coast where ships can take shelter and we should then see what has already happened in England and Scotland, viz., that there would be a large development in those particular centres of large boats and large capitalists working those boats. It is not in my mind a desirable state of affairs. As regards demonstrations I would like to say that as regards fish curing business which is one of my chief businesses, we are turning now our yard into a demonstration yard in this way ; we have arrived at certain definite facts and methods, and we are now proposing to extend to the general public a knowledge of those methods and we propose to do it (and the proposal is before the Government) by the Fisheries Department taking up the 120 fish curing yards which are around the Coast, taking charge of them entirely and introducing into them our methods generally, so that the fish curing public in general will obtain in that way not only a knowledge of those methods, but will have to carry out those methods, in which case the public will be provided with a very large quantity of very good food instead of the inferior food which is now being consumed.

Q. Are you going to have any trawlers or fishing smacks?—*A.* By and by. But for the war we should have a steam trawler drifter, but that is only for exploring the sea, and when we have arrived at certain conclusions after say, five years we should endeavour to get the fishermen to build boats—large sailing or motor boats—which would carry on that work in the deep sea. At present we have not the knowledge and they have not got the boats.

Q. Is the western coast much deeper than the eastern coast?—*A.* There is a forty mile belt on an average which is under the 100 fathom limit, that is, the practical trawling limit ; whereas on the east coast it is perhaps only a ten or fifteen mile belt.

Q. Are you in favour of Government pioneering either big or small industries?—*A.* It is a difficult question to answer straight away.

Q. Say an industry like the aluminium industry on a large scale?—*A.* There is a proposal, I believe before the Government, by which the Government will pioneer a series of linked industries by means of what I may call a technological institution, and that would be a very big thing. Fisheries are a very big thing and Government are pioneering them.

Q. Would you include small industries?—*A.* Those I have mentioned are chiefly small industries.

Q. About this loom industry, are foreign yarns being used?—*A.* Machine yarn and large quantities are being imported, I am told now. They are using largely machine spun yarn, very largely Indian. I am only speaking now what I knew a few years ago when there were large imports of spun yarn.

Q. Hand spun cotton yarn has practically disappeared, has it not?—*A.* It is entirely machine spun, but whether it is Indian spun yarn or foreign spun yarn I cannot say.

Q. What counts?—*A.* I do not know.

Q. There is practically no foreign spun yarn below 24 counts that ever was imported. About the Museum, did you see that in Tokyo?—*A.* Yes.

Q. Do you think that a museum of that kind, if established in different big centres like Calcutta, and Bombay, would be useful?—*A.* I think so.

Q. You want that samples of foreign imports should be there?—*A.* That was the original idea from which this museum started.

Q. There is a danger in that. If you exhibit the thing made here and also the foreign manufactured article, it may be copied by the foreigners or may compare unfavourably?—*A.* We want to copy them.

Q. Is there say chance of more co-operative societies being formed here? How many have you got?—*A.* Mr. Govindan knows more than I do on that point, but in the last year or two I think we have got three, besides this co-operative industrial society—I forget whether that is the third or fourth.* Mr. Govindan knows more about it.

Q. Is there some chance for more?—*A.* Yes.

Q. Is your Department actively working to create societies?—*A.* One great part of Mr. Govindan's work is that.

Hon'ble Pandit M. M. Malaviya.—*Q.* Your note is so full and instructive that there are only a very few points to ask you about. It is the most valuable of all the notes that have been submitted to the Commission. You say here, " It is a universal rule in Germany and Austria that all spending departments of Government shall purchase home products almost exclusively, and this has been highly beneficial; defects, under local competition, were temporary and competition led rapidly to perfection." I suppose you are familiar with the rule in force in India regarding the purchase of articles for the public service? It lays down that " All articles which are produced in India in the form of raw material or are manufactured in India from materials produced in India, should, by preference, be purchased locally provided that the equality is sufficiently good for the purpose and the price not unfavourable ". I understand that you would like the proviso to be more liberalised?—*A.* That is a case which we have to decide on each individual item. I have had pencils put before me for trial which were quite impossible. On the other hand pencils are also brought to me which are quite good.

Q. You say in another part of your note, " If Government will guarantee that all these departments shall use indigenous goods . . . . . . " In that view would you recommend that this present rule should be modified, that all articles which are produced in India in the form of raw material or manufactured in India from material produced in India should by preference be purchased locally provided the quality is sufficiently good?—*A.* Sufficiently good. That rule seems to be correct. I would buy the pencil even if it would cost a little more.

Q. You would interpret the clause " and the price not unfavourable " in that sense, *i.e.*, even if it would cost a little more?—*A.* Yes. It is a small subsidy or bounty in other words.

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* Now (October 1917) there are nine.

Q. Regarding articles manufactured in India from imported materials, there is a rule at present "that the price is as low as that at which articles of similar quality can be obtained through the India Office." You would recommend here also that the rule should be modified in this way, that it should not be insisted on that the price should be as low as that at which articles of similar quality can be obtained through the India Office?—*A*. I would not insist on it.

Q. You think that even if the price is a little higher, encouragement should be given to indigenous articles?—*A*. If the price is a little higher it will introduce the competition of other firms, but by the competition of these firms you will not only get a better material, but gradually it would be cheapened.

Q. Are you in favour of pioneer factories, because you think that that will train up experts and instruct people in the technique of the industry, in addition to making the necessary experiments to establish the industry successfully?—*A*. Yes. They are object lessons as well as places of experiment.

Q. On the question of limits to Government assistance, you rightly point out that even a fair competition from outside may ruin an incipient industry here. Would you for that reason recommend that the incipient industry should be protected in such ways as may be possible against such competition?—*A*. Yes, if it is necessary.

Q. As you point out, the Government is bound to consider Indian interests firstly, secondly, and thirdly?—*A*. Yes. I mean by firstly, that the local raw products should be utilised by "secondly" that industries should be introduced, and by "thirdly" that the profits of such industry should remain in the country. It is both a universal expression meaning entirely and is also interpretable in the way I mention.

Q. You lay great stress upon the Department of Industries supplying information to capitalists. Do you think that that will itself be a great encouragement to industrial development?—*A*. Yes. Real information thoroughly worked out on a commercial, and industrial basis by an expert; otherwise it is misleading.

Q. You say that some of the British firms applied to you for information on more than one occasion. Have you found any Indian firms showing the same inquisitiveness?—*A*. I have had letters from Indian firms in which it was said, "I hear that you are starting a soap industry. Will you kindly inform me by return of post what your methods are and what prospects there are for profits if I start a similar industry," in other words I was asked to write a complete treatise on the manufacture of soap and to state the chances of profit that there are in a particular place. That is the sort of enquiry I have had, and I have had many of them from the Indian people. But the enquiries I have had from British firms have been of the most detailed and practical description, and then, as I have said, that was merely a foundation for a possible expert coming out to examine thing for himself. I expect a man in the cannery department.

Q. Would you consider these enquiries private?—*A*. They ask me in all cases to be confidential.

Q. You have clearly indicated in what way you think the Department of Industries should be constituted. And you have advocated the establishment of industrial and commercial museums to play the same part as such museums have played in Germany and Japan?—*A*. Yes.

Q. You have suggested that the Director of Industries should have a body of men to advise him, that he should have executive powers and that the Board should be only advisory. Would it not be possible to create an executive of the Department of Industries such as exist in other countries to carry out the executive part of the work?—*A*. I do not know of any such thing.

Q. You recommend in section VI that in this Presidency, and I suppose that would apply to the whole of India, we might adopt a constitution similar to that of the Japanese Council for Economic Investigation, though you make one distinction. You think that it is better that executive functions should be exercised by an individual of the right calibre than by a body. But you point out that the power of the purse and all executive work rest with the executive of the Bureau in the case of the Japanese Council?—*A*. Yes.

Q. Don't you think that that would be a better arrangement even here than entrusting these powers to one individual?—*A*. The executive of the Bureau *is* an individual. For instance, he would be the head of the Fisheries Department, or the head of the Soap Department. When I mention "executive", I mean the executive officer, not necessarily an executive board.

Q. Have they got the President of the Council as their executive?—*A*. I cannot tell you exactly. In Ireland the President is Sir Horace Plunkett. He was executive not as President of the Board, but in his individual capacity as a public servant.

Q. Did he carry out the resolutions which the Council had arrived at?—*A*. No. He took their advice, but he formed his own decision.

Q. In conformity with that advice?—*A*. Not necessarily. It does not necessarily follow.

Q. In the event of their not agreeing was there any provision for reference to any higher authority?—*A.* No. As I have pointed out, in Ireland the Council had a very considerable voice in the matter because they had a veto on the expenditure.

Q. That veto would be exercised in cases of considerable expenditure ; would it not?—*A.* I cannot say. I do not recollect the actual facts. I have not examined that particular point. I was interested chiefly in fisheries.

Q. As matters stand here suppose you had a Council like the one you have suggested,—it seems to me to be an excellent type to get a large body of men to be associated in promoting public interests,—so far as the executive part of the work is concerned, instead of entrusting it to the Director of Industries, if you had an executive of this Council, say, three or five men,—whatever the number may be, to decide how money should be applied, would it not be more satisfactory from the public point of view?—*A.* I do not think so. I think one pair of hands is better than many. I think, as a matter of fact, that one single individual carrying out on mature experience and enquiry and with the advice of his Council, would be more satisfactory than an executive body with divided opinions.

Q. Where there is a large sum to be spent, the Council may take a different view from what the Director takes. How would that difficulty be met?—*A.* I think the Director, even though solely invested with the power, would hesitate to embark on a scheme which was decidedly objected to by a strong and representative board

Q. How would he know before-hand before incurring the expenditure? He must know whether the expenditure was objected to or not?—*A.* Yes. I have suggested that they should meet once a quarter. An industry is not started in a month or two. An industry, especially a new one, is probably the result of the thought and enquiry of years and therefore there is no chance of the direct springing up of an industry suddenly without the complete advice of the Board.

Q. At one stage or another, the matter must come before the Board. For instance. if they want to exercise the veto, will it not be better that the matter should be discussed by them first and their opinion obtained?—*A.* That is my idea. Otherwise it will not be an Advisory Council. If their advice is not sought it would not be Advisory Council.

Q. In case the majority was not against a particular proposition, but a strong minority was, would you give power to the Director to carry out the decision without further reference to Government, or would you wish him to refer the matter to the Government?—*A.* I would say that the Director would choose his own line. After all the minority may really be the most influential part of the body.

Q. You would leave him to decide for himself?—*A.* Yes, whether he should take the views of the majority or the minority. I do not think, as a matter of fact, it would ever happen.

Q. What method would you suggest for publishing the information that the Department of Industries would collect, apart from the commercial museum which you have mentioned? Would you recommend bulletins or a regular gazette?—*A.* I think that is of great advantage, but the best way of promulgating information is by getting people to work.

Q. But information about a large industry may be required by more than one person, and that information can best be given and obtained either by a bulletin or a gazette, or a trade journal?—*A.* Yes. Commercial bulletins are useful, but for spreading practical work, we find that even a demonstration factory is not sufficient, and that is why, as I have told you just now, we are proposing to take up the large fish-curing factories in order to make our method reach the people.

Q. You have recommended the establishment of a standing exhibition on the lines of the Commercial Museums of Japan and Germany in the headquarters of every Presidency or Province, but there are many more business centres and commercial centres in every province. Would you recommend that there should be one such exhibition established at each centre?—*A.* I said that there should also be exhibitions for particular industries at particular places, and I illustrated it by mentioning Madura.

Q. You would confine it to the particular local industry?—*A.* Yes. That is found to be the case in Japan. I found there certain museums and certain exhibitions devoted entirely to demonstrating the industries which were locally existent ; for instance, at one place it would be entirely the silk industry and in another place it would be something else.

Q. You have suggested that the standing exhibition might and should be popularised by occasional special displays as in December-January 1915-1916, and you also recommend that there should be lectures delivered by experts?—*A.* We found it extremely useful both to the persons who delivered the lectures and to those who heard and read them. It is an item of general public education.

Q. You are of opinion that there should be instruction and propagandist work in all cases?—*A.* Yes.

Q. Turning to the question of training of labour and supervision, you say, "I consider that the best way both for starting selected industries in India and for training the future managers is after the fashion of Germany and Japan and other countries, for the promoters, whether Government or private to draw liberally on Great Britain, etc., for real experts as first managers of any projected industries; then to select young men, preferably, men already trained in technological institutions, and to put them through close, disciplined, industrial and business training under these experts till they are fitted either to start on their account or as reliable business managers to capitalists." That is, undoubtedly, an excellent system of imparting this education. You say also that Government should find technological schools or institutes where young men can begin their technical training and then put them through some local factory to complete their education, and practical training. But in view of the number of factories existing in India being small at present—until a number of pioneer factories which you have suggested are established,—would there be sufficient training available to young men in the way you suggest?—*A.* At any one place there would not be many young men under training.

Q. If pioneer factories such as you have suggested are started, and I think there is no reason why they should not be,—but if they are not, don't you think that it would be better to have industrial schools where technical instruction and training may be imparted?—*A.* Would you put a concrete case?

Q. For instance, you have suggested the development of the furniture trade. I do not know if there is any school of carpentry here at present?—*A.* It is not a question of carpentry so much as of art such as is carried out in the School of Arts in Madras. It is not a school of mere carpentry.

Q. The two things are combined at Lucknow. They teach drawing designing and carpentry work?—*A.* Carpentry is a necessary item and joinery.

Q. If there is a factory started I have no doubt that it would serve the purpose, but if it is not started and if there is started a school where drawing, design and carpentry work are taught, would it not help to promote the industry?—*A.* Undoubtedly, technical instruction would be an important item in helping to start it, but it does not start it. It would prepare young men for subsequent actual factory work—the teaching of drawing, manual work, design and such like.

Q. From your experience don't you think that drawing and manual work should be made an essential part of instruction all over the province?—*A.* I am not an educationalist and I cannot answer the question. I know the importance of drawing and I wish very much that several of my subordinates can draw or can understand drawing. Want of drawing is a very great want indeed.

Q. Did you notice how widely the knowledge of drawing is cultivated in Japan?—*A.* I saw it in school myself. Even in agricultural classes they were teaching drawing.

Q. You say here, "Moreover as industrial history shows, the technological institute mostly follows and does not precede industries." Have they not gone on *pari passu* in Japan?—*A.* I do not think any technological institution has started industries anywhere.

Q. Not started an industry but preceded the growth of industries. For instance, the Engineering School at Tokyo was started in 1872 when there were few industries in Japan?—*A.* I will take the Fishery Institute if you like, because I happen to know that. That was only started in order to improve the existing fishery industry. The industry was there all right, but they wanted to develop it on different lines and so they started at first a school which gradually became the Fishery Technological Institute, so that the Technological Institute there followed the industry. The development of an existing industry to a certain extent followed the technological institution.

Q. The various industries which you have mentioned as possible of development here, would require some technical and technological knowledge in the men who would be engaged in them as artisans, foremen, managers?—*A.* Yes.

Q. The foreman class would be trained I take it, under the scheme that you have recommended, where you get experts from England or other places?—*A.* Yes.

Q. As for the artisans, you say, "Under such men, viz., the original experts and their disciples, there will gradually grow up the body of artisans who, at first drilled by mere rule into exertness will, in a properly run factory gradually develop an intelligent understanding of and attention to works."?—*A.* That is my own actual experience.

Q. I understand that in Japan, they are put through an industrial school where they learn drawing, carpentry, blacksmithy, forging, and modelling and all that, and then they go on to work as apprentices, and thus they give a practical turn to their training?—*A.* In many cases they have.

Q. Don't you think that for creating a really good artisan class, we need similar institutions and similar training here?—*A.* I think the men trained in these secondary schools in Japan usually go into the foreman class rather than the artisan class. They have been educated as teachers or instructors—my experience has been very largely, as teachers. The fishery schools had been found impossible, and they have all broken down except the Fishery Institute where they are training men for higher theory and practice.

Q. You did not pay any particular attention to the training imparted in other industrial schools?—*A.* No, except as regards agriculture. I did go in to the agricultural schools which I have fully described in my note.

Q. You recommend that students should be sent abroad to study, of course, after careful selection, and you recommend that they should be appointed as junior commercial agents to send reports bearing on particular industries?—*A.* Yes.

Q. What should be the practical method of sending out students? Would you increase the number of scholarships which are available for students going abroad, or State stipends?—*A.* Stipends, certainly. There are already Government scholarships and I believe there will be more and I believe there is a rule that the men, shall, if possible, be already engaged in the industry which they are to investigate and in which they are to be further trained.

Q. Not necessarily, but that they should be men who are likely to utilise their knowledge. Those rules have been subjected to criticism and there is much room for improvement in the selection of students, but do you think that the number of students already sent out in that way should be larger than it is?—*A.* I would send any man whom I thought would really benefit by the training if it were necessary for it. I may say that Mr. Govindan accompanied me to Europe and he was already deeply engaged in the industry and he had a long training in the Museum at Madras, and his stay at home has, I believe been extremely valuable to him in his subsequent work in the industry because he had a good knowledge of the industry before he went and he was therefore able to understand in what way the industry might be developed in India from what he saw in England and Scotland.

Q. You yourself have described the numerous industries which can be developed here and in order to supply a sufficient number of men properly trained to carry on these industries and to select men who should go out abroad to complete their education, would you be in favour of establishing higher technical schools such as you find in Germany and Japan to train men of the foremen class?—*A.* I have not thought over the thing. I could not pronounce an opinion on that point.

Q. You have stated that there are seventy members in the Japanese Council and in the Department of Industries in Ireland 168. Do you think that it would be desirable here to have some members from every district in the Presidency?—*A.* No. I think I have said persons from any district where such persons show any special proclivities. It may be a Forest officer, or Collector, or District Board Member, and so on.

Q. But so far as possible should not every district of the Presidency be represented on the Board?—*A.* Most probably ; I do not know of any district where there is not something to be done.

Q. As you have pointed out, you want to interest the best thought of the country on the subject and to interest it continuously and in a practical way?—*A.* Yes. Certainly there should be continuity of policy. That is one great advantage of a large Board.

Q. You have suggested that this Council might meet once in a quarter?—*A.* That is a matter of detail. It might meet as often as might be found necessary?

Q. The great advantages that you expect from matters being brought before such a general body are that matters will be better threshed out and widely discussed and known and there is less chance of anybody grumbling at any particular act?—*A.* Yes.

Q. You have very effectively pointed out the advantages of protection, but we are not permitted to discuss it at present. You urge however that at any rate such exceptional treatment as you have suggested, for instance, exemption from income tax at the earlier stages of an industry and exceptional treatment to selected industries which are shown to need some assistance should be extended?—*A.* Yes, and removal of customs duties in certain cases.

Q. Without infringing on the question which we are not permitted to discuss, it comes to this that, wherever the Government can render any help, it should render it to enable the industry to grow?—*A.* Yes, considered help.

Q. You say you advocate the importation and employment of " home experts ", because that will enable the students to learn the art practically in a better way here?—*A.* Yes. I have given the reasons. First by starting the factory here we should actually be starting the industry itself and under Indian conditions, and secondly we can keep our men under our own eyes.

Q. And a larger number of men will benefit by such training?—*A.* Yes, and there will be a greater certainty of success.

Q. You would supplement this system by the practice of sending out selected students to complete their training abroad?—*A.* Or supplement their training. My soap expert is a case in point.

Q. You suggest in the case of clocks and watches that expert superintendence and instruction should be given in a Government factory where managers, foremen and artisans could be trained, and you also suggest a similar Government factory in the case of enamel and of electroplated ware. You have now in England technological institutes which impart instruction in the theory of a subject and also give practical training in the workshops which are attached to them?—*A.* Yes.

Q. Would it not be an advantage to have such an institute where all this training would be available in the different branches for which there is an obvious need?—*A.* Training, as I have said, in England follows an industry. The training school is there because there is an industry existing and I do not think you should have a technological institute here on the mere chance of some industry being started.

Q. But we are dealing with industries for which you have suggested there is room and some of which are already being worked in some places. Take for instance canning, the thing is being worked. Take electro plating ; this is also being done in some places. Take again bakery ; we have got the Biscuit Factory in Delhi for manufacturing biscuits ; but the complaint is that they could not get expert advice and assistance. That shows the need of having some central institute where instruction and practical training can be imparted by experts who should be imported from England for the various trades?—*A.* What I mean is that you could not have a technological institute in advance on the mere chance of these thirty-five industries being started. Where there is an existing industry you can have a technological institution to develop it.

Q. I am speaking of the industries which you have suggested should be taken up as pioneer works, and would not a technological institute be helpful for the supply of men for them?—*A.* I do not think so. Not in advance.

Sir D. J. Tata.—*Q.* It is a question of road following commerce or commerce following road?—*A.* I quite agree that there should be a technological institute to develop the existing industries, but you cannot start an institute merely on the chance of bringing into being or creating an industry ; and even if you do for one particular industry, you could not start a general technological institute to embrace thirty or forty industries.

Q. The road must be made to follow the existing commerce. You must not make a road simply on the chance that some commerce might arise?—*A.* Yes.

Hon'ble Pandit M. M. Malaviya.—*Q.* You have suggested a school of industrial cookery for the present and you suggest that it may be developed at the Government Cannery?—*A.* I am interested in it personally.

Q. In view of the large possibilities of development of this industry, would one such school meet the needs of even this large Presidency?—*A.* Every industry begins on a small scale and in one or two places. We do not begin with a whole congeries of bakeries at once. They will begin one after another and one school is quite sufficient.

Q. You have a great faith in the future of the hand-loom industry in this Presidency?—*A.* I do not say about the future, but I say it ought not to be neglected in view of the enormous population that exists by working the hand-loom.

Q. As you find that even in countries where factory competition has become more intense the hand-loom industry is still living, you expect that it will live in this country also?—*A.* Yes. It is still existing in spite of great factories.

Q. Apart from the question of development, so far as the supply of machinery is concerned, are you satisfied that sufficient financial help is available to the cottage handloom industry at present?—*A.* I do not know anything about the details of it. I suggest that being so large an industry it should be taken up by the Department of Industries with a view to developing and stimulating it as far as possible.

Q. You have not considered the financial side of this problem, so far as financial help needed by these handloom weavers is concerned?—*A.* No.

Sir F. H. Stewart.—*Q.* Is there any explanation you would like to give or anything else you would like to tell us?—*A.* I have seen in the newspapers articles advocating an Imperial Department of Industries. I may say at once that an Imperial Department of Fisheries is all right so far as zoological enquiry goes, but as regards industrial problems connected therewith, they are so entirely separate in each presidency that an Imperial Fisheries Department could not possibly deal with them.

Q. **Would you let us have details of your budget?—*A.* Yes.**

Q. **Have you studied the fishery problems in other Presidencies at all?—*A.* No.**

Letter—from R. D. Bell, Esq., I.C.S., Secretary, Indian Industrial Commission.
To—Sir Frederick Nicholson, K.C.I.E., Honorary Director of Fisheries, Madras, Calicut.
Dated—the 3rd February 1917.
No.—2917.

I am directed to enquire whether you will kindly furnish the Indian Industrial Commission with a statement of Revenue and Expenditure of the Indian Fisheries Department for the last year or two. The Members would specially like if separate statements can be given for any commercial or semi-commercial undertakings managed by the Fisheries Department such as the Cannery at Beypore and the Soap Factory at Calicut.

Letter—from Sir F. A. Nicholson, K.C.I.E., Honorary Director of Fisheries Madras.
To—the Secretary, Indian Industrial Commission, camp.
Dated—Chepauk, the 22nd February 1917.
No.—69.

Replying to your letter No 2917, dated the 3rd instant, I have the honour to forward herewith statements A, B, C and D showing the Receipts and Expenditure of the Fisheries Department for the two years 1914-15 and 1915-16; similar statements for 1916-17 will be sent after the close of the official year.

2. The notes on the statements give explanations as regards details, but I may add as follows, viz.:—

Honorary Director. Piscicultural Expert. Marine Biologist (and Superintendent, Pearl and Chank Fisheries).	European.
Assistant Director. Assistant to the Piscicultural Expert. Oil Chemist and Soap Expert.	Indian.

(1) The half lakh or so shown as the net cost of the Department consists partly of the salaries of the staff, viz., three European and three Indian in the superior grades as marginally-noted, and their travelling allowances, partly of capital expenditure and of expenditure not directly remunerative partly of the necessary office and miscellaneous expenses.

(2) Much of the work is necessarily experimental and research, and is therefore non-remunerative; even in the cannery, fish-yard, and soapery, a certain amount of loss is incurred in pure experiments.

(3) Much of the work, e.g., that of the Sunkesula fish farm and all larvicidal work, is not *directly* remunerative since the work of the first named is intended for the stocking of large areas of barren waters (e.g., 200 miles of the Cuddapah-Kurnool Canal and various large tanks) from which the revenue return will eventually be derived in fish rents, while the economic return will be in the vastly increased food supplies of fish. The growth and distribution of masses of larvicidal fish is, of course, non-remunerative from a revenue stand point and is purely a sanitary and preventive measure.

(4) The Department does not levy a single anna by way of taxation; nevertheless it is expected eventually to become self-supporting in all matters except those of pure experiment and research or for the improvement of fishing harbours, etc., for which however the surplus revenues from the rentals of stocked waters, manufactures, etc. will be available.

A

***Statement showing the Revenue and Expenditure of the Madras Fisheries Department for the official years* 1914–15 *and* 1915–16.**

Year.	Revenue. Total amount.	Expenditure. Total amount.	Net cost.
	RS.	RS.	RS.
1914–15	91,730	1,46,603	54,873
1915–16	1,35,700	1,83,805	48,105

Details for Revenue.

	1914–15.	1915–16.
	RS.	RS.
(1) Fishery Bureau receipts	41,080	72,922
(2) Pearl and Chank Fisheries receipts	50,650	62,778
	91,730	1,35,700

Details for Expenditure.

	1914–15.	1915–16.
	RS.	RS.
(1) Fishery Bureau expenditure	1,02,847	1,31,556
(2) Pearl and Chank Fisheries expenditure	43,756	52,249
	1,46,603	1,83,805

B

Details for Fishery Bureau Expenditure, 1914–15 *and* 1915–16.

	1914–15.	1915–16.
	RS.	RS.
Salaries of officers	25,992	(*a*) 35,592
Do. of subordinate staff and establishment including temporary establishment	10,019	(*b*) 15,470
Travelling allowance of officers and subordinate staff	15,939	(*c*) 13,707
Supplies and services—		
Director's works, viz., West Coast station and cannery, soap-making, etc.	24,033	(*d*) 27,817
Piscicultural works, viz.—		
Sunkesula fish farm, stocking of tanks, Ippur fish farm, larvicidal work, Powder factory scheme, Nallamalai scheme, etc.	21,185	(*e*) 19,649
Marine Biologist's works—		
Oyster farm and marine fish farm	1,661	891
Soap manufacture (expenditure included under Director's works for 1914–15)	...	(*f*) 14,961
Contingencies	3,968	(*g*) 4,369
	1,02,847	1,31,556

Details for Pearl and Chank Fisheries.

	1914–15.	1915–16.
	RS.	RS.
Establishment	6,897	(*h*) 5,273
Travelling allowance	808	676
Supplies and services—		
Purchase of chanks, running expenses of motor boats and vessels and examination of pearl banks	21,610	39,587
Contingencies and miscellaneous (includes Tondi Pearl Fishery charges in 1914–15)	14,441	6,713
	43,756	52,249

(*a*) Increase in 1915–16 over 1914–15 is due (1) to incremental additions to pay of the European staff (Piscicultural Expert and Marine Biologist) and (2) to a monthly allowance newly made to the Honorary Director.

(*b*) Increase is due to the reorganization of the subordinate staff during the year.

(*c*) Decrease due to withdrawal of travelling allowance from the Honorary Director on grant of a monthly allowance.

(*d*) See detailed statements C and D.

(*e*) These works are not *directly* productive of revenue, being devoted to stocking barren waters, [illegible] work, etc., but are of great general economic and hygienic value.

(*f*) Soap making in 1914–15 was confined to the manufacture of fish oil soap for insecticidal use [illegible] manufacture of ordinary soap was only begun experimentally in 1915-16.

(*g*) This consists of several items, viz., tour charges, service postage and telegraph [illegible] municipal rates, purchase of and repairs to furniture, etc.

(*h*) The pay of the Superintendent is debited to "Salaries of officers" supra, since the [illegible] (J. Hornell, Esq.) is also the Marine Biologist.

The profit is derived from the purchase of chanks fished by divers and their sale [illegible]

C

Expenditure and Receipts of Beypore Cannery, 1915–16. (*a*)

Particulars.	Amount. RS.	A.	P.	Total. RS.	A.	P.
Expenditure—						
Capital cost—						
Permanent additions to plant and sheds ..	1,582	6	4			
				1,582	6	4
Running cost—						
Empty cans and solder	3,720	1	7			
Ammonia	222	8	0			
Pay of regular staff maintained throughout the year.	2,046	6	6			
Rent for office at Calicut	270	0	0			
Fish for freezing and canning	1,117	13	6			
Fish condiments (including oil for packing) ..	344	5	0			
Petty cooly, carriage, railway freight and batta and railway fare for staff.	1,124	7	11			
Fuel, firewood, coal, kerosine, lubricating and other oils, etc.	871	4	11			
Cost of stores purchased in the previous years and used during 1915–16.	1,383	0	0			
Miscellaneous, such as packing paper, twine, etc.. .	481	12	5			
				11,581	11	10
Total ..	..			13,164	2	2
Receipts—						
Sale-proceeds of canned fish	5,121	15	6			
Do. of frozen fish	81	4	3			
Do. of prawn shells	18	0	0			
Do. of cured fish	129	9	6			
Miscellaneous sales, such as rancid butter, fried oil, etc.	109	7	5			
				5,460	8	8
Value of canned goods on hand	3,965	15	8			
Do. sold but not realized.. ..	373	5	2			
Value of miscellaneous produce, such as prawn shells, guano and pit manure on hand.	62	4	0			
Value of miscellaneous stores on hand	1,905	2	7			
				6,306	11	5
Add value of permanent additions to plant and sheds as above.	..			1,582	6	4
Total ..				13,349	6	5
The balance (profit) ..				(*b*) 185	4	3
				13,164	2	2

D

Expenditure and Receipts of Oil Chemist's Soap Factory for 1915–16. (*c*)

Particulars.	Amount. RS.	A.	P.	Amount. RS.	A.	P.
Expenditure—						
Capital cost—						
Permanent additions to shed and plant ..	1,180	0	0			
Furniture and fittings	110	0	0			
				1,290	0	0

(*a*) The year 1914–15 was mostly occupied in building the cannery and placing the machinery; hence figures are not given for that year.

(*b*) The profit is very small since the year was disastrous as regards the supply of fish and only about 27,500 cans were packed. With 60,000 cans packed there should be a good profit, and with 100,000 (which could easily be packed by the plant) a large one.

(*c*) Ordinary soap-making only began in this year; hence figures are not given for 1914–15.

Expenditure and Receipts of Oil Chemist's Soap Factory for **1915–16—contd.**

Particulars.	Amount.			Amount.		
	RS.	A.	P.	RS.	A.	P.
Expenditure—*contd.*						
Running charges —						
Value of raw materials consumed	5,868	8	2			
Value of sundry stores used up	21	10	0			
Firewood consumed	37	5	0			
Packing materials used	305	4	7			
Manufacturing wages	278	14	6			
Railway freight, cart hire, batta to staff, etc. ..	119	8	4			
Value of soap on hand on 1st April 1915 (fish oil).	695	8	7			
				7,326	6	2
Receipts—				8,616	6	2
By sale of fish oil soap	7,530	6	9			
Do. of toilet and other soaps	751	0	3			
				8,221	7	0
Add value of permanent additions to sheds, plant and value of furniture as above.	1,290	0	0			
Value of fish oil soap on hand	362	5	2			
Value of toilet and other soap	1,582	15	6			
				3,285	4	8
Total receipts ..						
Deduct expenditure ..				11,516	11	8
				8,616	6	2
Net profit ..				(*a*) 2,900	5	6

(*a*) The manufactures were chiefly of fish oil soap for insecticidal purposes, of which 28 tons were made and sold. The ordinary soaps from vegetable oils and tallow were only made experimentally and in small quantity.

WITNESS No. 250.

MR. R. D. CONNELL, *Works Manager, the Magnesite Syndicate Limited, Suramangalam, Salem district.*

WRITTEN EVIDENCE.

Magnesite industry.

I have had little or no experience of those general matters on which the Commissio require evidence as shown by the list of questions enclosed with your letter but I ca give you my experience of the difficulties which we have met in endeavouring to develo the magnesite industry in India and which I presume would come within the scope o the Commission's enquiry.

Crude magnesite, of which there is an unlimited supply in these deposits is used fo the manufacture of salts of magnesium, principally magnesium chloride and magnesiu sulphate (Epsom Salts). When the crude mineral is subjected to a calcination at temperature of 800°—1000° C the resulting product is known as lightly calcined o caustic magnesia and is used in the manufacture of sorel cement which forms the basi of several kinds of artificial stone, flooring, etc., which are sold under various trad names in the United Kingdom and Europe. If the calcination is carried on at a highe temperature (1700°—2000° C) the magnesite loses its cementatious properties and becomes dead burnt, sintered or shrunk magnesia which is a highly refractory material and is used for the making of fire bricks, the lining of steel furnaces, etc.

At the Salem Works only the lightly calcined material is produced as it was foun that owing to the high cost of fuel it was not profitable to manufacture the dead burn magnesia.

Before the war our principal markets were in the United Kingdom and in Europ and as our principal competitors were Greece and Austria it was only when the marke was high that we could export the calcined magnesia from India. As the marke fluctuated considerably and at frequent intervals the working of the quarries and plan was very intermittent which was not conducive to the steady and efficient developmen of the industry. There is at present no market for the calcined material in India but I am of opinion that there is scope for a new industry in the manufacture of artificial ston floorings, etc., from calcined magnesite although there still requires some experimenta work to be done in order to determine the class of material which will best suit India conditions. If a market for the material could be created in India and make us partially independent of the foreign market it would assist us to the steady and continuous development of the industry. Since the war started it has become increasingly difficult to ship owing to the high sea freights and at the moment of writing the works are at a standstill.

ORAL EVIDENCE, 5TH FEBRUARY 1917.

Mr. A. Chatterton.—*Q*. How long have you been Manager of the Salem Magnesite Syndicate, Limited?—*A*. Five years.

Q. What previous experience have you had of this sort of work?—*A*. Of the mineral itself I have had no previous experience. I was previously up in the Central Provinces in manganese mining.

Q. Have you had any regular training as chemist?—*A*. Yes. I was at home.

Q. How long would it be since magnesite was first worked at Salem?—*A*. It must be fifteen or twenty years ago. Very little work was done during the first five or six years.

Q. These magnesite mines are quarries?—*A*. Yes.

Q. Do you export crude magnesite?—*A*. We have done.

Q. That is being sent to Madras?—*A*. Yes.

Sir D. J. Tata.—Q. When did you commence sending it?—*A*. Within the last two months. I got the first word of it only in December.

Q. Are you sending any magnesite to Northern India?—*A*. There is very little going to Calcutta.

Q. What do you mean?—*A*. We sell it in small parcels, from 20 to 30 tons.

Q. Every month?—*A*. Yes.

Mr. A. Chatterton.—*Q*. In working these magnesite deposits, do you come across chromite?—*A*. In our deposits there is very little chromite.

Q. Have you a laboratory for experimental work in connection with the development of new ideas?—*A*. We have, but only in a very small way.

Q. You say that the chief difficulty with calcined materials is the lack of a local market. At one time there was an attempt to make magnesite cement. Is work in that direction still going on?—*A*. We are not doing very much ourselves. Some one else might take it up. It is entirely a matter of opinion.

Q. Unless you open out a market, it is hardly likely that anybody else will come along?—*A*. That means a good deal more work than we can put our hands on and we are rather confining ourselves at present to the purely mining side of it.

Q. How are you working? Have you got any concessions from the Madras Government?—*A*. I have got concessions partly from the Madras Government and partly from the local jaghirdars.

Q. Are you paying royalties on the output?—*A*. Yes.

Q. What is the royalty?—*A*. We pay royalty to the jaghirdars at the rate of six annas a ton and to Government at the rate of three annas a ton with a dead rent to Government.

Q. No dead rent to the jaghirdar?—*A*. No.

Q. With regard to the matter of fuel that you have mentioned here, are you using coal?—*A*. Coal.

Q. Where does the coal come from? Madras?—*A*. From Bengal.

Q. What is the cost per ton at Salem?—*A*. Rs. 20 a ton delivered at the Works.

Q. Is it delivered at the Works?—*A*. Yes.

Q. Have you got a special siding at the works where it can be delivered?—*A*. Yes.

Q. You are not using any wood fuel at all?—*A*. No. We gasify the coal. The coal is not burnt in the same furnace as the magnesite is burnt. Otherwise the ash would contaminate the magnesite.

Q. You have got a gas producer?—*A*. Yes.

Q. What is the annual output of these mines?—*A*. It varies very considerably. It comes to nine or ten thousand tons on an average during the last five years.

Q. Do you know for what purposes magnesite is exported?—*A*. It is used for the lining of furnaces, making of fire bricks. If it is lightly calcined, it is used for several kinds of artificial stone, flooring, etc.

Q. Is it used in the cotton mills?—*A*. I think it is. The magnesite itself is not used, but I think that magnesium salts are used in the cotton mills.

Q. Does any magnesite go to the paper mills in Bengal?—*A*. Not that I am aware of. At least it does not go direct from us.

Q. You are not making any of these chemicals that you mention?—*A*. We are not making. I understand it is made in Calcutta.

Q. You do not supply anything to the Chemical Works at Ranipet?—*A*. Recently they have taken it up.

Q. They are developing the manufacture of magnesium sulphate?—*A*. Yes.

Q. May we take it that the prospect of the development of these deposits depends upon further chemical research and experiment?—*A.* I think so.

Q. And your company would rather let the thing be done by other people?—*A.* Yes. Our company has spent a good deal of money in developing it so far and is not inclined to go further.

Q. What establishment have you got? Have you got any other Europeans?—*A.* No. We have got one Indian chemist who has been trained.

Q. Is he a graduate in chemistry? What work is he doing?—*A.* He is doing only the routine testing of the products.

Sir D. J. Tata.—*Q.* Do you use coal or coke?—*A.* Coal. We gasify the coal.

Q. You say that some of your stuff is going to Calcutta? Have you any idea of what it is used for?—*A.* For chemical works. It is only the crude material that we are sending to Calcutta.

Mr. A. Chatterton.—*Q.* Where do you ship this from?—*A.* Madras.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Before the war how much were you able to sell?—*A.* Four to five thousand tons.

Q. You are producing only four to five thousand tons?—*A.* On an average.

Q. Why are you anxious to free yourself of the foreign market?—*A.* The market in Europe fluctuated so much that it was not conducive to a steady industry.

Q. Is there competition always with Greece and Austria?—*A.* Yes. Greece and Austria are our competitors.

Q. Is Bengal the chief buyer?—*A.* I think so. Ours is a superior class of flooring. It would not be able to compete with the ordinary chunam floor and therefore the market that we get would be in the big centres where there are large works going on.

Q. What is the capital of your concern?—*A.* It is registered.

Q. Could you take up other work also?—*A.* We have spent a good deal of money already and there has been very little return.

Mr. C. E. Low.—*Q.* Before the war what were the respective prices of the crude magnesite and the dead burnt?—*A.* The price of the crude came to about 25 shillings a ton. The lightly calcined came to 70 to 80 shillings a ton in Europe. Dead burnt about £5 per ton.

Q. What is the freight to Calcutta?—*A.* It used to go from here to Madras and from Madras to Calcutta. The railway freight from Salem to Madras is four rupees per ton and the sea freight from Madras to Calcutta used to be six rupees.

Q. It is not as heavy as manganese?—*A.* The crude magnesite runs about 27 cubic feet to the ton.

Hon'ble Sir R. N. Mookerjee.—*Q.* What was the rate before the war to England?—*A.* About 23 to 25 shillings from Madras. We never sold the crude magnesite. It was never exported.

Mr. A. Chatterton.—*Q.* What is the loss in weight?—*A.* About 50 per cent. We reckon about 2¼ tons of the crude to make one ton of the calcined.

Mr. C. E. Low.—*Q.* And the dead burnt?—*A.* It is very much the same. It shrinks.

Q. Have you ever attempted to make furnace bricks?—*A.* We never attempted that.

Q. Had you any demand for magnesite for bricks?—*A.* We have been asked about it. We were asked by the Steel Works of Tata and also one or two enquiries from Japan.

Q. Is there any magnesite in Japan or Korea or China?—*A.* Not that I know of. I do not think so.

Q. Where does Japan get her magnesite?—*A.* I could not say.

Q. Is there any mine there?—*A.* I have not heard of it. There is a good deal on the western coast of America.

Sir D. J. Tata.—*Q.* Are there any other deposits?—*A.* There are some in Mysore.

Q. Who is working the proposition in Mysore?—*A.* It is doubtful to say that.

WITNESS No. 251.

DR. W. H. HARRISON, *Government Agricultural Chemist, Coimbatore.*

WRITTEN EVIDENCE.

With reference to your letter No. 2386, dated the 18th December 1916, inviting me to give evidence before the Indian Industrial Commission, I have the honour to forward herewith a statement regarding the possibilities of Applied Chemistry in Madras.

With regard to the other subject suggested in your letter, viz., "The general question of the recruitment and employment of experts" I may say that, as far as the Agricultural Department is concerned, evidence was tendered to the Public Services

Commission by the Madras Department as a whole, and that I do not think I have anything to add to that. Further, in the recruitment and employment of experts so many factors have to be taken into account that I feel that I am unable to offer any general remarks of any real value.

I, therefore, beg to be excused from tendering evidence on the general subject but if the Commission desires evidence on specific points I shall be only too glad to meet the requests to the best of my ability.

Notes on the possibilities of Applied Chemistry in Madras.

1. In reviewing the position of the Madras Presidency with reference to the possibilities of Applied Chemistry, it must be admitted at once that the general aspect is not of a promising nature, for the mineral resources of the Presidency are neither varied nor extensive, and in particular the paucity of *ordinary* fuel and energy sources is a severe handicap. There appears to be practically no prospect of the establishment in Madras of extensive chemical industrial centres such as are usually associated with the term and consequently all that can be hoped for in the immediate future is the establishment of such chemical industries as will meet, in some degree, the requirements of those industries which are found to be commercially possible and also certain requirements of the population. Such developments will of necessity aim at the utilization of indigenous products or of cheaply imported raw-materials.

2. In considering the problem, attention must be paid in the first instance to the available energy resources of the Presidency. Coal is practically non-existant so that its employment necessitates importation from other Provinces; and this fact will greatly militate against the development of industries in districts remote from the coast. Wood is available and is used as a source of power in certain districts, but the supply is limited and prices are rapidly rising, so that this cannot be considered a hopeful source of energy unless an increased demand is more than met by a correspondingly increased productivity of the forests; and even in that case the inaccessibility of many of the forest areas in conjunction with the cost of transport would limit the localization of possible industries to a comparatively few places. Oil fuel imported from Burma must also come under consideration, but within my own experience trials have shown that as a steam-raiser it cannot at present prices compete with wood in the Coimbatore district so that its utility appears to be greatly restricted. The only remaining source which appears to be feasible is electric energy generated by water power but here again difficulties arise in that so many water courses in South India, otherwise quite satisfactory, are available for this purpose for only a portion of the year. Still much can be done to meet the situation by arranging suitable storage together with the utilization of perennial streams. This source of energy in fact appears to be the most promising for employment in the development of possible chemical industries and special attention is drawn to it in the resolutions of a Committee appointed in 1909 by the Government of Madras to consider the question of the establishment of chemical industries in the Madras Presidency.

3. The position as thus outlined is not encouraging but nevertheless there is a strong possibility that Madras is able to manufacture certain important substances which are either demanded now, or will be in the near future, to satisfy the requirements of her population and at the same time to produce several basal chemicals required by those industries which are capable of development.

Madras is and will always remain an essentially agricultural country and there is already an appreciable demand for concentrated manures which will rapidly increase in the near future and particularly with regard to nitrogenous manures. It is in the direction of manufacturing these substances that the services of applied chemistry can most advantageously be directed by utilization of electrical energy, with the added advantage that this industry can be extended to the manufacture of other important substances hitherto imported in considerable quantity. The first step would be the production of nitrates, suitable for the planting and "dry" districts and of cyanamide or nitrolim which can be utilized in paddy districts under conditions which prohibit the use of the former. From the latter substance the production of ammonia and its compounds is a comparatively simple process whilst incidentally the manufacture of carbide would supply cheaply a substance in demand for illuminating and engineering purposes. A variation of the process of manufacture would lead to a supply of cyauide for which there is a demand in the gold fields.

The manufacture of these products should serve to put the industry on a sound commercial basis and the energy source could then be developed in other directions some of which are—

(1) The manufacture of aluminium to meet the very considerable local demand.

(2) The manufacture of alkali thus favouring the extension of soap, oil, glass industries, etc.

(3) The production of bleaching agents for use in the local textile industries.

(4) The manufacture of phosphorous.

(5) The production of carbon bisulphide for solvent and fumigation purposes.

The above indicates sufficiently clearly that [illegible] very advantageously utilised even in the present state of [illegible] and it seems even more probable that further developments can [illegible] methods are being worked out by which the phosphoric acid in low [illegible] deposits is extracted in the pure state and worked up into high [illegible] a process such as this would be of material benefit to South India by [illegible] of Trichy phosphates. The application of electrical methods to metallurgical [illegible] is rapidly extending and it appears probable that methods will soon be evolved [illegible] will allow of the successful working of the valuable deposits of magnetite in the [illegible] district.

In addition to the application of electric energy attention should also be paid to the utilization of those catalytic processes recently developed for the manufacture of sulphuric nitric acids, ammonia, and the hydrogenation of oils. Established industries such as tanning, the production of essential oils and perfumes which are as a rule carried on by primitive methods are capable of great development and for this purpose the services of Applied Chemistry would be exceedingly valuable.

4. The following brief statement summarizes the position arrived at:—The paucity of ordinary fuel and mineral resources greatly limits the possibility of successfully utilizing the services of Applied Chemistry in Madras, but by utilizing electric energy produced by water power it is possible to manufacture locally many substances which form a basis of several arts and manufactures which can be established in that Province. In particular the manufacture of artificial manures is of the utmost importance.

ORAL EVIDENCE, 5TH FEBRUARY 1917.

Sir F. H. Stewart.—*Q.* You belong to the Agricultural Department?—*A.* Yes.

Q. Is your work partly researh and partly teaching?—*A.* Yes, and partly executive.

Q. You say in your evidence that as far as the Agricultural Department is concerned, evidence was tendered to the Public Services Commission by the Madras Department as a whole. You say that in the recruitment and employment of experts so many factors have to be taken into account that you feel unable to offer any general remarks. But that is one phase of our enquiries?—*A.* What I mean to say is that in regard to the general recruitment of officers for any department, I do not think that I can offer any useful evidence. With regard to my own department I shall be willing to answer any question I am able to.

Q. It is entirely at your option whether you answer any question or not and any answers that you may wish to be treated as confidential will be treated as confidential. The suggestion has been put before us many number of times that there might be an Imperial Service of Chemists to which all chemists should belong whatever they may be, and that their services might be distributed as required. It was suggested that then they would have better prospects and that their services could be utilised more completely than now and that this would facilitate inter-working and so on? Have you got any views to offer on the subject?—*A.* It is such a broad proposition and so much depends upon the details that I do not think that I can offer any useful remarks except with regard to my own department. With regard to my own department I am not at all favourable to the centralisation of chemists.

Q. Would you allow things to remain as they are, so that the Agricultural Departments might have their own chemists?—*A.* The conditions in the different provinces are so different from one another. The man in the provinces must know the peculiarities and needs of his own province and the local conditions. I do not see how you can get away from the Provincial Departments.

Mr. C. E. Low.—*Q.* At present you have a scattered body of chemists in many different services, *e.g.*, the Customs, Excise, Ordnance factories, Education, etc. etc. The idea is that, leaving out of consideration for the present the Agricultural Department, you might have an Indian Chemical Service getting men for certain kinds of work on varying terms, for varying lengths of time. They would all be in touch with the head of the service, namely the Chief Chemist with the Government of India. What would you say in regard to a proposition like that. Would it be a convenient way to deal with all the non-agricultural services, would they fit in with the Agricultural Department or do you think that the agricultural services should be put on a separate basis altogether. Have you thought of both the points of view?—*A.* That is a very broad proposition. In the first place I do not think that you have taken into account the different duties of the different chemists, the different kinds of chemists. You have mentioned the case of the Customs Department. I presume that there only analytical work is required. That of course you could centralise. Again you want men to do investigation (witness interrupted).

Q. These men would not be centralised in one place. Of course they would belong to the same service. At present you get a lot of men who are not able to shine in their work. One man may prefer teaching work; another man may prefer doing research?—*A.* I felt the difficulty in my own case. I have never been trained for teaching and yet the first thing that I had to do in Madras was teaching.

Q. Th[illegible] cou[illegible] who prefer the school and education?—*A.* Yes. I ould like [illegible] with such a man. That is the difficulty, I know. That , due to [illegible] expected from chemists vary so much. As I have said ou have [illegible] work and also research work. If you want to have esearch [illegible] on the spot. I cannot see how the imperial central uthority [illegible] all these different types of chemists.

Q. [illegible] will pass to the local authority, that is the local Director of ndustries?—*A.* That I presume is just the position. I am liable to be transferred to ny other province in India.

Q. Only as an Agricultural Chemist?—*A.* Yes.

Q. The unfortunate thing is that often a man is deputed for work for which he is ot suitable?—*A.* That is quite true. That is what happens at present.

Q. Suppose he is in Bombay. He will be under the Local Director of Industries here, if there is one, and he will get advice on technical points from the central authoity?—*A.* I do not see how it differs in any way from the present conditions.

Q. You mean in the Agricultural Departments?—*A.* I have no experience of the utside departments. What I am afraid of is that any scheme of this kind would bring a dual control. Once you get dual control, your work will fail. If any officer is carryng on any industry, he must be under the orders of one man.

Q. What is your position?—*A.* I am independent.

Q. Are you independent of the Institute at Pusa? Could you ask a man there to ome if you want to?—*A.* I believe he will have to get the permission of the Madras overnment.

Q. They do as a matter of fact?—*A.* They do.

Q. Can a local chemist get any help?—*A.* That depends upon the particular roblems. I do not believe that the man at Pusa could give any help in regard to local onditions.

Q. Yours is black soil?—*A.* My first work was on black soil. The soil here is ltogether of a different formation and I do not think the conditions elsewhere will apply ere.

Q. Do you think that the work of the chemist should be passed by some one else?— . I think the head of the department must be a non-departmental man. I would rather ave some external officer at the head of my own department. I think an efficient fficer of that type would lead to great efficiency in the department.

Q. A large body of chemists are now working in commercial firms and their work is assed by their own men at the top?—*A.* That in itself is not sufficient reason. It all epends upon the personality of the man at the top.

Q. You would therefore prefer that the agricultural services should be left out in ny scheme of organisation?—*A.* Yes. My main reasons are of course that problems in griculture are local. The conditions of one province vary from that of another.

Q. You want to give the agricultural chemist a strong agricultural bias?—*A.* Yes.

Q. You think that he will have to acquire a long experience in the department t nable him to find out the problems of the locality and take them in the order of thei mportance. If not he is not likely to start investigation on useful lines?—*A.* Muc epends upon the personal bias of the man.

Q. In order to do that, he must know something of agriculture in other provinces —*A.* Not necessarily. You cannot bring a man from Northern India and set him traight away on South Indian local problems.

Q. Then what would you say as regards chemists?—*A.* There is nothing difficult i gricultural chemistry. If a man is a good chemist he will soon pick up the essentials.

Q. As you point out in your note there are many hydro-electric propositions whic night be investigated and it has been suggested that as the project at Periyar is unde nvestigation, cyanamide might be produced. Would there be a fair market fo yanamide outside India?—*A.* Yes in Ceylon.

Q. Do you think they would absorb it in Ceylon and the Straits?—*A.* I think they vould.

Q. For what object?—*A.* My main object is for the manuring of paddy fields.

Q. How much would South India be able to absorb?—*A.* I should think that forty housand tons would be absorbed in South India.

Q. In how many years?—*A.* The point is this. If you make forty thousand tons o yanamide you have only to put it on the market as a first step in a series of marketabl hings. Carbide is the first step. I have nothing to do with the planting districts bu part from those I think the main opening would be with regard to paddy and not wit eference to dry cultivation.

Q. Supposing that such a thing were started do you think that the local demand wil grow?—*A.* There is quite a considerable demand in the south of India with regard t rtificial manures.

Q. Have the Madras Government ever published papers on this problem?—*A.* Yes.

Q. Have you given your opinion on that?—*A.* I have several times been asked with regard to the Periyar scheme and its utilisation.

Q. With regard to manure, would it pay the ryot to use the manure?—*A*. He is already paying Rs. 60 a ton for manures containing six per cent of nitrogen.

Q. You mean cakes?—*A*. Yes. On paddy lands cakes are not of much use but the ryots use green manures. Cyanamide is too dear at present for most of the ryots, but what is essential is a big supply of cheap nitrogen.

Q. Do you think that Government will be able to secure market prices on favourable terms?—*A*. I do, for the simple reason that if India is going to increase her yield, she must get into the right way of using fertilisers and the cheaper we can get the manure the better. We must first get the ryot to use that and then the demand will come.

Q. Would you say that a certain proportion of it should be sold for a certain number of years at a particular price? And then you can take the full market price?—*A*. Yes and we actually have had manure depots run by our department.

Q. You have never had a depot run by a commercial firm?—*A*. No.

Sir D. J. Tata—*Q*. What are the relative advantages of the manures? Which are most suited?—*A*. Ammonium sulphate and cyanamide. Nitrates are absolutely unsuited for the wet paddy.

Q. What about the sulphates?—*A*. Ammonium sulphate is the best manure that I know of for paddy.

Q. And for things like sugarcane?—*A*. It is very good. In any place where the land is kept rather wet, I should say that nitrates are not suited.

Q. What facilities are there for making sulphates of ammonia in this country? Is it possible to make it here?—*A*. None at present in the south of India.

Q. You are aware that there is a good deal of coal tar made round about in Bengal, and that it is now possible also to make large quantities of ammonia?—*A*. They are putting it on the market now.

Q. Are they suitable for the cultivators there?—*A*. I do not know the conditions in Northern India sufficiently well to answer the question.

Q. Will they find the market for all that they make? The demand for it could be very great?—*A*. If manuring were accepted by the ryots the demand would be very great.

Q. A good deal of sulphate of ammonia is used in Java as I understand. There they have found it to be a valuable manure, and I suppose if the cultivators were induced to use it, it would be of great benefit to them. Which do you think is the more beneficial? The nitrates or the sulphates?—*A*. Sulphates of ammonia. I have been working at that problem.

Q. There has been a suggestion about the utilisation of water power for the purpose. The idea is that it should be up to Government to store the water and utilise it for electrical purposes. In just the same way would you be in favour of Government making the nitrates and distributing them to the ryots and making the ryots pay for it, just as they distribute canal water?—*A*. I do not agree with that, so far as it applies to nitrates. The reason is that sooner or later I anticipate a great demand for artificial manures from paddy cultivators. I would prefer to see a scheme which looked upon the formation of nitrates as of secondary importance. The formation of cyanamide is of primary importance as ammonia can be produced from it.

Q. For intensive cultivation in Java and Germany it is nitrates that they use?—*A*. Not on paddy fields.

Q. In Germany all the progress that they have made in agriculture is due to the use of nitrates?—*A*. That is for dry cultivation. That is under dry conditions. Nitrates would be a very valuable manure both for dry areas and the planting districts in South India.

Q. What would you say to the proposition that the Government should make the nitrates and sell them to the cultivators just as they distribute water?—*A*. I should say "no" if it referred only to nitrates. I am only speaking of South Indian conditions.

Q. Would it not be possible in the south of India to develop the use of sulphate of ammonia?—*A*. I think with regard to paddy it would be. There would be a big development in that direction. In fact there has been a good deal of progress in that direction during the ten years that I have been in this department as regards the ryots' attitude towards the use of manures.

Q. What manure is suitable for wheat?—*A*. We do not grow wheat here.

Q. I understand that Pusa has done a good deal in regard to wheat?—*A*. I should prefer to abstain for the present any great attack on the manure problem with regard to dry land, at least the poorer quality dry land. The bulk of the land in Southern India gives only a minimum crop. It will go on giving that crop and improved cropping is a thing that we can develop only slowly. On the other hand with regard to paddy, there you have a valuable crop. You have got a fairly heavy crop in the better class land, and there is no doubt that the first development in manuring will take place with regard to paddy, and we want manure suited for that, leaving out of account the planting districts and the garden lands and lands under occasional irrigation. They are of course heavily manured now. The ryot in Southern India understands manuring.

Q. What about oil cakes?—*A.* They are using it for sugarcane in the Godavari area. There is an actual market in regard to oil cake and castor cake.

Q. What about fish manure?—*A.* The demand is greater than the supply.

Q. Do you think that could be used with great advantage?—*A.* Yes. But the supply has been very limited during the last few years.

Q. You would advocate the development of that?—*A.* That is one of the manu which I recommend should be used on a large scale.

Q. Do you think that the manufacture of artificial manure is of great importance? *A.* In the scheme that I formulated the manufacture of cyanamide and carbide wou come first, and from that I would carry out the manufacture of ammonia. It is a case decomposing with steam—and from this ammonia you can easily get nitrates. You c manufacture a whole series of products. If you manufacture nitrates direct you mu have a separate plant. In the schemes I propose you will have a series of products of which would have a marketable value.

Q. Is nitrolim a different thing from cyanamide?—*A.* It is the trade name cyanamide. "Nitrolim" is a rather misleading term. One confuses it with the nitr of lime.

Mr. A. Chatterton.—*Q.* Turning to the other questions which have been raised your note, I should like to ask in connection with the supply of artificial manure agricultural work. We have had various schemes before us for a long time in this p of the world and also in Northern India for the manufacture of artificial manu Private enterprise has not come forward and nothing has practically resulted. Assumi that no better progress is made in the immediate future, do you think that Governm will be justified in going into the very large expense of establishing pioneer industr in this direction and utilising the water powers which have been known to exist, that to say, whether the Government should undertake the manufacture and disposal manures?—*A.* I do most distinctly. The whole subject of the utilisation of chemi energy and problems of electrolysis is quite a new one and is developing very very fa It is more or less an experimental industry. Even though it is established in cert countries it is still an experimental one, and I think that Government ought to w out a large and complete scheme so as to test at once their feasibility in South India a also any future developments as they arise. They will occur and they will progr rapidly.

Q. Looking at the purely agricultural point of view and the development of yield of paddy, do you think that the position is so urgent as to demand that a compa tively early action should be taken in the matter?—*A.* It is not urgent unless we ge cheap supply of nitrogenous manures.

Mr. C. E. Low.—*Q.* Some of the results and processes are so very important t something may turn up of real value?—*A.* It is so difficult to say.

Q. There is always that possibility. If Government had control over hydro-elec schemes for example they will be able to keep abreast?—*A.* That is an essential po That is the only important source of energy that we have got, and I think that Gove ment ought to be in a position to test any development at any time as regards the utili tion of water power.

Mr. A. Chatterton.—*Q.* You advocate that the manufacture of cyanamide sho be taken up?—*A.* Yes.

Q. The question has been raised whether there would be an immediate market for quantities that might become available considering the scale on which the industry m be started. Have any experiments been made by the Agricultural Department w cyanamide on a fairly large scale?—*A.* We are trying it on the farms but mainly w regard to paddy.

Q. On what scale?—*A.* The matter is in the usual experimental stage.

Q. Are the results on a sufficiently large scale to attract the attention of the r population?—*A.* They have only been on an experimental scale.

Mr. C. E. Low.—Have you had prices quoted for cyanamide?—*A.* We can l locally through the agents at Coimbatore. There is a big supply of manures to planting districts from Coimbatore.

Mr. A. Chatterton.—*Q.* These experiments have been made only on small plots have the results been published?—*A.* No. They are not published except in the dep mental annual reports.

Q. Is it contemplated that the Agricultural Department here should carry out t work on a fairly large demonstration scale?—*A.* If the experiments are successfu carried out on the various farms, then that can be managed quite easily.

Q. Do you advocate purchasing from Europe sufficiently large quantities of cya mide in order to create a market for the stuff?—*A.* Yes.

Q. Do you remember that a committee on chemical industries was started ab seven or eight years ago and some of these questions were discussed in this commit and you will remember that that committee eventually adjourned *sine die* practically account of the attitude which was taken by the then Secretary of State in regard to part that Government ought to play in regard to the development of industries. Do you think that if that committee had continued it would have been fruitful of any practical results?—*A*. If the conditions in Southern India were favourable, I should say that the committee ought to be a permanent one at least as regards the department of industries but I have pointed out that the conditions in Southern India are not favourable to the development of the chemical industries of the ordinary type.

Q. Is it not a fact that so far we have scarcely had any sufficient information regarding the sources of minerals, etc., in the south of India to determine whether chemical industries can be carried on successfully or not? Would you advocate that more attention should be paid by the Geological Survey to the south of India, especially from the economic side?—*A*. I should think so. We should have full information regarding the mineral resources of the south of India.

Q. You mention that there are some beds of phosphates in Trichinopoly district. Have these been properly surveyed and the value determined?—*A*. They have been. They are low grade phosphates. They contain a good deal of iron and under the present methods of manufacture they give a poor quality superphosphate. But already in America electrical methods are being developed and it is quite possible that in a very short time it will be possible to manufacture quite a good grade superphosphate from a low grade mineral phosphate. In that case these deposits might be utilised to better advantage.

Q. Are they sufficient to justify considerable research with a view to make the most of them?—*A*. One of my assistants has been working for three years on this problem.

Q. Are they on a sufficiently big scale to justify extensive work?—*A*. Yes. They are. They are quite extensive and also valuable. But they are low grade phosphates and give a poor quality superphosphate.

Q. In connection with the manufacture of cyanamide, large quantities of lime will be required. Have we got at the present time sufficient information as to the extent to which lime of a special character can be developed?—*A*. I do not think we have. But one of the assistants in Tinnevelly came across good samples of pure calcite which if it is available in large quantities, would remove the difficulty.

Q. May we take it as a fact down here that we have got to do a very large amount of work, preliminary work in connection with the investigation of these deposits before we can look forward to anything like definite propositions for industrial work? Are there sufficient numbers of these deposits of lime stone that are obviously suitable for this class of work?—*A*. There are very good deposits up in the Shevaroys.

Q. The position is this. A great deal of scientific investigation is required as a preliminary to the development of industrial products and do you consider that that work should be taken on as soon as possible?—*A*. An investigation of this kind is very important under present conditions and the sooner it is taken up and carried out the better. This applies not only to the south of India but the whole of India.

Mr. C. E. Low.—*Q*. Don't you think that the various chemical and engineering problems that will come up are very highly specialised research problems and will require very expensive plant? Don't you think that would justify the appointment of an Imperial Institute of Scientific Research in some form or another in this country on a big scale apart from any question of its location?—*A*. I think it is distinctly advantageous that there should be some central place to which specific highly specialized problems could be referred but I do not consider that it justifies the formation of a department of chemists.

Q. You think there is a strong necessity for something of the sort?—*A*. Specialised research problems and problems which might apply to specific things might be carried on here.

Q. Take big scale problems the results of which would be taken up by highly organised firms which are likely to have their operations in several parts of India? Do you think that the firms will be able to do a certain amount of work?—*A*. I do not think a firm will take up such work.

Q. There are cases in which the Government might do a certain amount of work. We have been informed by some big firms that they are also doing a good deal of investigation?—*A*. That will depend on the nature of the problem.

WITNESS NO. 252.

MR. A. RAJAGOPALA CHETTIYAR, *Cloth merchant, Manojappa Chavadi, Papanasam taluk, Tanjore district.*

WRITTEN EVIDENCE.

I am acquainted only with the dyeing of silk and cotton thread. I [illegible] a memorandum showing the procedure adopted for the dyeing of silk and [illegible] [illegible]. In my opinion the above industry may be improved if Government will [illegible] [illegible] for the cultivation of nona plant and indigo on a large scale. I have not [illegible] [illegible] printed questions as most of them do not relate to the subject in [illegible] [illegible] [illegible] [illegible].

Memorandum showing the procedure adopted for the dyeing of silk and cotton thread before and after the war.

Before the war.—Foreign dyes (colour powders) were used for the dyeing of silk and alizarin red and other colour powders were used for the dyeing of cotton thread.

After the war.—As foreign dyes are not available now in sufficient quantities, the following procedure is adopted for the dyeing of silk and cotton thread.

(1) *Dyeing of silk.*—Indigo stick-lac (red), Orange (Kapili), and yellow (Manjal) are used. Indigo is dissolved in the fuller's earth and kept for 3 or 4 days and then used for white silk to produce black-colour. Stick lac (red) is powdered and mixed in the boiling-water in a pot and made into a paste by a pestle. Water with red colour separates leaving the Arakku powder. This colour is used for white silk to produce red colour. This red silk if dipped into the solution of indigo and fuller's earth produces dark blue (Nilam). Saffron is powdered and mixed with water and used for silk to produce yellow colour. This yellow silk is dipped in the solution of indigo and fuller's earth to produce green colour.

Orange colour.—Kapili (Orange powder) is got from Salem, Vizagapatam and Berhampur. Chunam (Kilinji chunam) and fuller's earth are separately dissolved in the water and kept in two separate pots for two days. The chunam water which stands at the top is boiled and the silk is dipped in this to make it polished silk. Alum and gingelly oil are mixed in another pot and the solution of fuller's earth is boiled to the boiling point and mixed with the solution of alum and gingelly-oil and the polished silk is dipped in it and next day it is taken out as Orange coloured silk.

(2) *Dyeing of cotton thread—Red colour of nona root.*—Gingelly-oil and sheep's dung are dissolved in water and kept for a day. White cotton thread is dipped in it and dried. This process is repeated daily for 9 days. The cotton thread so used is kept for 3 months and then dipped in water and dried. The bark of the nona root is mixed with castor-oil and powdered. Two seers of cotton thread prepared as above are mixed with ½ Madras measure of the above powder dissolved in water. It is kept soaked for a day and then dried. This process has to be repeated daily for 9 days. The best red colour is then produced though the process is tedious.

Black colour for cotton thread.—Indigo is dissolved in chunam (Kilinji chunam) and kept for 3 or 4 days. White cotton dipped in this solution produces black colour.

Yellow.—Saffron is powdered and mixed with water and white cotton thread is dipped in it to produce yellow colour.

NOTE.—*Witness did not give oral evidence.*

WITNESS NO. 253.

RAO BAHADUR P. SOMASUNDARAM CHETTIYAR, *Agent, the Malabar Spinning and Weaving Company (Limited), Kallai, the Calicut Tile Company, Feroke, Malabar and the Kaleeswarar Mills (Limited), Coimbatore, Kallai (Malabar).*

WRITTEN EVIDENCE.

Q. 1.—I raised a capital of rupees six and a half lakhs for the Kaleeswarar Spinning Mills, Limited, Coimbatore. Capital.

All the above capital was subscribed by Indians.

I experienced some difficulty in satisfying the subscribers about the soundness of the industry before they subscribed. If the soundness of any industry were made known to the investors and if the management of such an industry was undertaken by an experienced and trustworthy individual or firm with the necessary experts under them, difficulties for forming new industries would be avoided.

Q. 2.—Capital for the above spinning mill was principally subscribed by merchants, bankers and some vakils.

Q. 3.—I know that in some places a large number of cotton ginning factories are started where Kappas (or cotton with seeds) is not available to work the gins throughout the year. In such places oil mills, paddy huskers, and machines for crushing groundnut shells were also erected side by side and worked by some of the ginning factories at times when they do not get sufficient Kappas for their work. Others without such additional machinery have to suspend their work during certain periods of the year.

Q. 8.—I am of opinion that a committee may be appointed to advise Government regarding the formation and development of new industries in this Presidency and Government should pioneer such new industries wherever possible and hand over the same to the public at a reasonable price at the stage when they find that they are commercially profitable. Pi[illegible]

Q. 15, 16 *and* 17.—The share-holders of the Punalur Paper Mills in Travancore State asked me to undertake the management of their mills. They were in no need of financial assistance. For want of an expert they were not able to work the mill satisfactorily. I also declined to undertake the management for want of an experienced Technical aid.

In this connection I beg to submit that the Government should endeavour to bring experts from abroad, establish necessary institutions to impart technical education to Indians and to train them practically so as to enable them to work new industries. If this assistance was given by Government I think the financial assistance of Government will not be necessary.

Prevention of adulteration.

Q. 91.—Adulteration of raw cotton is done in Coimbatore and Tinnevelly districts. It would be better if some legislation is made to prevent such adulteration.

Trade marks and trade names.

Q. 94.—The present law of trade marks in India is out of date. Arrangement should be made to safeguard the registration of trade marks by legislation.

Railway freights.

Q. 98.—Special concession rates of rail freights are even now allowed by railway authorities for certain goods. But instead of assisting the industries, they do great harm.

I beg to submit a few instances :—

There is a special reduced rate for cotton between Tirupur Station in Coimbatore district in the South Indian Railway broad gauge section and Bombay as well as from Tirupur to Tuticorin. Speculators, such as Messrs. Rally Bros., Volkart Bros., and some Marwaris, purchase cotton in Coimbatore district and send it to Bombay and Tuticorin and deprive the local mills of their raw material.

On the other hand such concession rates are not allowed to the mill owners, if they purchase and send cotton from Bombay, Tinnevelly or Tuticorin, either to Tirupur or Coimbatore on the plea that Tirupur and Coimbatore are not sea port towns. So at present our requirements from Bombay are brought down to Calicut 115 miles away from Coimbatore and then rebooked to Coimbatore as the freight from Bombay to Coimbatore direct is more than from Bombay to Calicut and then to Coimbatore, although the wagon runs an extra distance of 230 miles between Coimbatore and Calicut and vice versa. By allowing concession rates to speculators and others they make purchases recklessly and send them to sea port towns in expectation of better prices from Japan and other countries. Sometimes the mill-owners also purchase such cotton in those places and bring it back. By this neither the actual ryot who tills the soil nor the actual consumer is benefit ed. It is the middle man who is profitted. Under the circumstances special reduced rates or concession rates should only be allowed to *bona fide* mill industries whether such industries are situated either in a sea port town or in the interior.

Hydro-electric power surveys.

Q. 102.—The Madras Government were contemplating two schemes for supplying industries with electric power, one from the Periyar Water Works in Madura district and the other from Siruvani Hills in the Coimbatore district. It will be a great assistance to industrial concerns if these schemes are soon taken in hand and the power supplied. If electric power is supplied, I am sure many new industries can be started profitably and the consumption of wood-fuel will be diminished, as the price of wood-fuel is abnormally rising year by year. Further it will bring down the price of wood-fuel and benefit the population of Southern India who use wood fuel alone for their domestic requirements.

General.

Q. 110.—If it is really meant to assist and encourage the existing Indian industries as well as the industries which may be started hereafter, a countervailing duty on all such imported goods as are manufactured in India should be levied.

Q. 112.—As cotton, which is the raw material for the mill industry, is exported from India by Japanese and others, a duty on the export of cotton will greatly assist the cotton mill industry in India. Even in normal times we experience great difficulty in the purchase of cotton. So an export duty on cotton is absolutely necessary.

NOTE.—*Witness did not give oral evidence.*

WITNESS NO. 254.

MR. N. GIRIYA CHETTIYAR, *Cloth merchant, Coimbatore.*

WRITTEN EVIDENCE.

Handloom weaving in Coimbatore.

Handloom weaving is in a flourishing condition in Coimbatore town. There are about 3,000 looms at work in the town. The goods prepared are mostly cotton (of fine counts) and silk cloths and turbans, interwoven or bordered with gold thread. These goods are mostly sent to the Mahratta countries in the north. Some of the villages near to the town follow the same sort of weaving. But in most of the other villages throughout the district only coarse cotton cloths for females and males are woven. There, also, country looms only are prevalent. Fly shuttle loom would be a boon to them.

The condition of the town weaver is far better than that of the villager. Except a few middlemen, every weaver is always attached to a trader. He gets a fixed amount of yarn or silk and gold thread from his trader and on turning them into finished articles gets his wages. He keeps to himself unused remnants of yarn and gold thread. Though his wages are low, yet he is well off with these savings. The fate of a country weaver is different. His wages are low and he has no opportunity of saving yarn or any other material.

As regards the question whether any improvement is possible in the art of weaving, the town weaver seems convinced that no improvement in his weaving is possible. The fineness of yarn and interweaving the borders with gold thread with various patterns, he thinks, makes it impossible to adopt fly-shuttle systems. Gold thread requires a nice handling in order to preserve its brilliancy, but the mechanical fly shuttle will certainly take away a shade in it and the finished product will diminish in quality. This is the opinion of the town weaver. But the Industrial Department seems to have a different and a hopeful view. If their view is practicable, they should teach the weaver by holding public demonstrations, open industrial schools where practical instructions should be given, and should convince the weaver about its practicability. Researches should be undertaken and worked out by experts appointed by Government to study whether such fine gold thread and lace goods can be manufactured with improved handlooms, easier, cheaper and quicker than those at present; and their results should be published to weavers through open demonstrations and industrial schools.

In order to relieve the poor weaver from overwhelming debt, co-operative credit societies may be started and loans at low interest may be given to them on security of their looms. But a co-operative industrial society for weavers does not seem to be a practicable thing to suit a Coimbatore weaver in his present condition and the attempt to establish such a one at the beginning of the war failed.

As regards the village weaver who deals mostly in coarse cloths, his lot can easily be improved, if the Department takes an interest in him. The fly shuttle will be a boon to him if he is made to handle it. He will certainly prosper with it unless factories compete with him and drive him out of employment.

The present war, unlike others in India has brought double misfortune upon the poor weaver of Coimbatore. The want of sufficient quantities of fine yarn and gold thread, drove several men out of employment, which is, of course, the general complaint everywhere. But the poor weaver of our town has suffered in another direction also. The high prices of yarn and gold thread would, in the ordinary course of affairs, tend to the increase in price of finished goods. But here the competition created by the advent of a few rich Marwaris who want to capture the whole market, had forced the traders to throw the extra burden upon the poor weaver and instead of adding the extra expenditure to the cost price of goods, they deducted it from his wages, and the weaver had no alternative but to submit. But this state of affairs is better now and should be so remedied that it should not recur again.

The Government should not allow France alone to enjoy the monopoly of gold thread manufacture and should encourage the starting and development of a gold thread industry in India. The same applies to dye-stuffs also. The industry of dye-stuffs should be encouraged both in England and India, so that crisis like that of the present may be averted in future. Experiments in indigenous dye-stuffs should be undertaken and worked out by experts appointed by Government and they should be utilised in the encouragement of manufacture of dye-stuffs in factories, whether Government or private, to be started wherever possible in India.

ORAL EVIDENCE 6TH FEBRUARY 1917.

Mr. A. Chatterton.—*Q.* You state that an attempt was made in Coimbatore to start a co-operative industrial society and it failed. Who made this attempt?—*A.* Dewan Bahadur L. D. Swamikannu Pillai, the Registrar, came here and at his instance a meeting was called and they tried to float a co-operative society and it failed.

Q. Will you tell us how the weavers in Coimbatore work? You say that most of them are attached to merchants in the town. First of all, do these weavers work in their own houses, or have they small factories in the town?—*A.* Each weaver works with his own handloom and they do not work in factories.

Q. Are there not cases of five or six looms in a single house?—*A.* In some houses there are five or six, and in some houses two or three, but in most houses only one.

Q. In those houses, where they have five or six handlooms, are cooly weavers working these looms?—*A.* Yes. If there is a family, the father and son and brothers work, and in some of the families they employ coolies.

Q. What wages do they pay to these weavers?—*A.* In the case of ordinary cloth they pay Rs. 5 a cooly for a cloth of 36 cubits long.

Q. How long does it take to weave a cloth of 36 cubits?—*A.* It takes ten or fifteen days. If the cloth is of a superior pattern they get more cooly, such as Rs. 10 or more.

Q. What are the highest counts that is used in Coimbatore?—*A.* 150 and sometimes 200.

Q. What are these used for?—*A.* Angavastrams and turbans.

Q. Are the weavers here in such a flourishing condition that they do not want any financial help?—*A.* Weavers are not in such a flourishing condition, but the traders are in a somewhat flourising condition

Q. You are a trader?—*A.* Yes

Q. Will you please describe the method of doing business with these weavers?—*A.* We supply yarn as well as gold thread and silk and we get finished goods and we pay wages to them for the product turned out.

Q. You pay so much a cooly for each piece turned out?—*A.* They turn out cloths about 36 cubits long and the wages depend upon the cloth which is woven. Sometimes hey vary from Rs. 10 to 25.

Q. What do you do with the goods that you receive from the weavers?—*A.* They are sent to the Mahratta countries mostly.

Q. Is there a steady market for the goods there?—*A.* There is a steady market for he goods.

Q. Is it not only during the marriage season?—*A.* Sometimes it becomes dull, specially when there is famine and plague, but during the marriage season the trade s somewhat flourishing.

Q. Do you hold a large stock of cloth here?—*A.* We do not store large stocks. Generally about Rs. 20,000 or 30,000 worth of stock.

Q. Do you get any financial help from any banks?—*A.* I do not get generally for the purposes of this trade, but for my banking business I get money. I have got a banking business and for that purpose I get loans from the Madras Bank and other banks.

Q. On what security?—*A.* Personal security.

Q. You are a banker?—*A.* Yes, and director also in many nidhis.

Q. Will you describe what these nidhis are?—*A.* They lend money to private persons and they get deposits also from various persons.

Q. What interest do you pay on the deposits?—*A.* Six per cent. and seven per cent.

Q. And at what rates do they usually lend money to private people?—*A.* Nine to twelve per cent.

Q. These Nidhis are joint stock companies?—*A.* Yes.

Q. And what sort of security do they take for the loans that they give out? Is it on jewels?—*A.* Jewels, grains and other things. In one of the banks they lend on landed property also.

Q. How many of these nidhis are in Coimbatore?—*A.* In the town proper there are eight and including the surrounding suburbs there are fifteen altogether.

Q. What is the capital of most of these nidhis?—*A.* Two lakhs or three lakhs in each nidhi.

Q. And they are divided up into shares?—*A.* Yes.

Q. What is the usual value of the share?—*A.* It sells at 20 or 25 per cent. premium.

Q. What is the face value of each share?—*A.* In some banks Rs. 25 and in some 50 per share.

Q. Who are the people who subscribe money to these shares?—*A.* Landholders, as well as petty merchants, traders, Government servants.

Q. Do these nidhis finance the weaving trade?—*A.* Some of these traders get loans from these nidhis.

Q. Is all the yarn used in Coimbatore imported?—*A.* Yes. Mostly through Madras.

Q. Has the Department of Industries sent a weaving demonstration parties down here?—*A.* Once it seems, some two years ago one of the parties came but it did not stay long and went away without making any impression upon the people.

Q. Are there any fly shuttle looms used in Coimbatore?—*A.* No. One or two are in the Roman Catholic Industrial School, but they are used for coarse cloth.

Q. You state that the weavers of Coimbatore are convinced that their work is too fine to be done on fly shuttle loom. Have they ever made any experiment to see if it can be done?—*A.* No. No experiment was done in Coimbatore, but I have seen in other places. The finished product is not as fine as that by the handloom.

Q. Are they using in this town the improved pattern harness that was invented in Madura?—*A.* No.

Q. At the present time, is there any difficulty about getting gold lace from France?—*A.* We do not get steadily, only in small quantities and the cost is very high.

Q. Are you acquainted with the factory which was started in Madras for making gold lace?—*A.* Yes.

Q. Have you used any of that lace?—*A.* Yes.

Q. Why did you not continue to use it?—*A.* It was not of such a superior sort as the France gold thread. It was not so nice. It was not good enough for the class of trade down here.

Q. You say that a certain number of Marwaris are come here?—*A.* Yes.

Q. Is that quite recently?—*A.* Four or five years ago.

Q. What have these Marwaris been doing here?—*A.* They have started in the cloth trade also.

Q. How did they get into the cloth trade?—*A.* These cloths are generally sent to the Mahratta countries and knowing it they have come and settled here and they have got large capital and are competing with us.

Q. And do they make large advances to weavers?—*A.* No. Not large advances. They are trading in the same way as the traders of Coimbatore.

Q. Why did the local traders of Coimbatore allow these men to get into relations with weavers here?—*A.* It was not possible to prevent them from settling here.

Q. But how is it that the weavers left their local merchants and went to the Marwaris?—*A.* If they give one anna more they will go to them.

Q. The Marwaris offered them better terms?—*A.* They have got a good deal of capital with them and they began to trade here and flourished, and having got a good capital they sent for gold lace and other things at cheaper rates because they ordered large quantities.

Q. They are better business men?—*A.* I cannot say that they are better business men.

Q. Have many of the local merchants gone out of the weaving trade in consequence of the competition of the Marwaris?—*A.* They have not stopped their work.

Q. Is the number of handlooms in Coimbatore increasing or decreasing?—*A.* It is increasing day by day.

Q. Can you tell us by how many?—*A.* Of course, as population increases looms also increase.

Q. How many weavers have you got working for you?—*A.* About 200.

Q. Would you be prepared to make experiments with fly shuttle looms and introduce them amongst your weavers if the Government sent a man to help in the work?—*A.* I can try, but it is difficult to weave cloths with gold borders in fly shuttle looms.

Q. That is a matter for experiment?—*A.* I can try it. It is better to have an industrial school for that purpose and to teach weavers in order to convince them that fly shuttle loom is better.

Q. There is an industrial school here?—*A.* There is a school here, but they deal mostly with timber and rough cloths. Now it seems they have stopped even cloth weaving. They were dealing with coarse cloth only and not with finer cloth.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* These nidhis—have they failed here?—*A.* Fifteen years ago one bank failed, but afterwards none of them failed.

Q. And you are director in two or three banks?—*A.* In six banks here I am a director.

Q. The interests of one bank do not clash with those of another?—*A.* No.

Q. From where do you get your thread?—*A.* Sometimes I get directly from France and sometimes from Madras merchants.

Q. You have got agents in France also?—*A.* Through the Bombay agents I used to get.

Q. Where do you get your 200's count?—*A.* We get those yarns from Madras only.

Q. And not from the mills here or factories?—*A.* Here they have got only 20 or 30 counts.

Q. You do not use that count?—*A.* No.

Q. And is all the superior cloth consumed in this Presidency, or does it go out of it?—*A.* Mostly it is sent to the Bombay Presidency, the Central Provinces and Berar.

Q. Through what place does it go?—*A.* Directly from Coimbatore they are sent. We used to send through railway only, but owing to increase of thefts at the railway stations and heavy freight, we now send mostly by postal parcels.

Q. Did you complain to the railway authorities?—Several times, but no reply. Last year one parcel was sent to Ahmednagar. The package was opened and half the number of goods were stolen away and so I am now sending by post.

Q. The charges are very heavy?—*A.* Yes. Nearly double and sometimes even more by post.

Q. How many handloom weavers are there in this town?—*A.* 2,500 or 3,000. They own their own looms.

Q. How much does each cost generally?—*A.* Rs. 10 per loom.

Q. Have you seen the new kind of looms in the jail here?—*A.* Yes.

Q. Are they of any use at all?—*A.* For these fine counts and gold borders they are not of any use. The gold goes away and the shade also diminishes.

Q. What about the dye stuff? Where do you get it?—*A.* We used to get German dyes only.

Q. But now what dye do you use?—*A.* Inferior dyes only are got now and even that at a very high price.

Q. Are you not using local dyes?—*A.* We use to a certain extent also.

Sir F. H. Stewart.—*Q.* Are there any recognised Indian banks in Coimbatore?—*A.* There is no Indian bank here.

Q. Only these societies?—*A.* Yes. There is a branch of the Madras Bank. There is no Indian bank here, but all these nidhis are banks only.

Q. Can you tell me why the attempt to form a co-operative industrial society here failed? The Registrar came and called a meeting?—*A*. The trade here requires a good deal of capital. Especially, the prices of gold thread and yarn are high and they require a good deal of capital. These co-operative societies cannot be of much use because the members only have to take shares and therefore it was not possible to have a co-operative society. At least one crore of rupees is necessary for starting a big co-operative society which could help all the people.

Q. Has any attempt been made to start co-operative credit societies in the villages?—*A*. Not for weaving purposes. But there are co-operative credit societies in villages near the Erode taluk. There are co-operative credit societies in the villages. There is a building society here. There is the District Urban Bank here and I am director and vice-president of it.

Sir D. J. Tata.—*Q*. There is a branch of the Madras Bank here? Does it give facilities to Indian merchants here?—*A*. On security.

Q. You have no complaints to make? We have heard in different places that European banks do not give sufficient assistance to Indian merchants?—*A*. It is true. The Bank of Madras assisted the Stanes Mill and the Mall Mill, which are managed by Europeans but they refused to assist the other mill (Ginning and Oil Manufacturing Company, Limited), which was started by our people.

Q. What was the reason you think?—*A*. They do not trust them.

Q. They must have some grounds for doing so. They had more confidence in the other people and not in you?—*A*. Yes, but they ought to have confidence in us.

Q. It is a case of whether the security that you gave was good enough?—*A*. The mill has got properties and they form sufficient security. There are also machinery and other things. Even when four of the directors said that they would stand as surety the Madras Bank refused. All the sureties were solvent people. They demanded some better surety.

Mr. A. Chatterton.—*Q*. Are you connected with the Kaleswaram Mills?—*A*. No. But in the Spinning and Weaving Mills and in the Mall Mills I have got shares.

Q. Have you any other remarks to make?—*A*. The Madras Bank has got a lot of Government money with them lying idle without much interest. They can give it as loan to these ordinary banks here at low rates of interest and thus utilise the money. Even the directors are ready to stand as sureties, and the directors are solvent people.

WITNESS NO. 255.

MR. W. E. WINTER, *Director, T. Stanes & Co., Coimbatore.*

WRITTEN EVIDENCE.

Q. 15.—So far as our experience goes with regard to cotton mills in India, there has been no necessity to seek Government aid on technical matters.

Q. 16.—We have no knowledge or experience of any noticeable benefit from researches conducted by Government Departments so far as cotton mills are concerned, but we think that there are certain branches which could benefit mills not equipped by European experts, such as dyeing, engineering or sizing of cotton warps.

Q. 17 *and* 18.—Provided the Government Expert produced a successful result, he should receive an interest in the benefit derived in the form of a bonus, but in this case the information elicited should be looked upon as strictly confidential.

If the research is initiated by the firm, then they should be entitled to claim the benefits and any results obtained should not be published without the written consent of the firm.

Q. 19.—No, with regard to cotton mills.

Q. 25.—The existing agricultural organization in South India is totally insufficient to control the growing of cotton so as to maintain or improve its quality. Cotton is undoubtedly deteriorating in quality in this district and hitherto no organised attempt by the Agricultural Department has been made in this district to control or improve cotton. This calls for better agricultural supervision. If the omission in the past has been due to paucity of staff, this should be remedied without delay.

Wood is the fuel of our district. At present it is easily available and comparatively cheap, but the price or rate is rising rapidly and will soon become prohibitive. The only other fuels usable are coal and oil; both of which are not produced in this Presidency, so that it behoves the Forest Department at least in this district to make every endeavour to increase the fuel supply and control it.

Q. 28.—We certainly think commercial museums are useful and instructive, and in particular they should make a point of obtaining and exhibiting specimens of the products, of any new departure in any industry which is capable of being developed in this country.

Q. 44.—The only way of improving the labourers' efficiency and skill that we know of, is that of setting apart so many machines in sections, the best output of any one section to be awarded a weekly prize. The maistry or jobber or overlooker of this section to be paid a prize on the aggregate output of the section, but the tenter of any one machine which has given the best output should also be awarded a prize. This system not only induces jobbers or overlookers to improve their skill, but it also induces the ordinary labourers to do so. The system can be applied to spinning, card room, and loom sheds.

Training of labour.

Q. 45.—We do not know of any step that could be adopted, only that of sectionizing a mill or workshop and paying a bonus for output.

Q. 46.—We have known boys of European parentage to enter factories as apprentices. They have commenced in the first stage of manufacture and gradually worked themselves up to a first class position.

Apprenticeship system.

Q. 49.—Our experience is that there is great difficulty in maintaining regular attendance of the children at these schools, and in spite of a money prize, which we offer to regular attenders, the difficulty remains. We think that these ought to be developed under compulsory free education and under municipal control.

Industrial schools, etc.

Q. 50.—We think that industrial schools should be left entirely to the Department of Industries, as dual control by two departments, having different objectives, always leads to inefficiency.

Q. 57.—The inefficiency of the present organisation of the Department of Industries, in this province, appears to be on account of its being purely an official body, and as such, it must be more or less out of sympathy with, and not in intimate touch with, the few larger industries existing. To avoid this, we consider that this organisation should be modified, by the suppression to a large extent of this purely official character, and that this could be best done by placing the department under the control of a Board of Industries. The constitution of such a Board should be broad, by including among its numbers not only heads of firms, but also in a large proportion those experts who are heads of departments in firms, and who have a special and intimate knowledge of specific sections of industries. This Board should also include one or two official members, one of whom should be president of the Board with the title of Director of Industries. He should also be considered the executive officer of the Board. It will be seen that the functions of such a Board are mainly executive in character, and as such budgeted funds should be placed at its disposal. It would also have an additional recommendation in that it would be a permanently constituted Board, which could act in an advisory capacity to Government. Finally Government would be able to control it through the agency of its president who should be in direct communication with Government.

Official organisation.

Q. 78.—There is in India, and this province in particular, a difficulty in obtaining a ready reference to technical and scientific works and it would be a great advantage to industrialists, if a good reference library were established from which books could be obtained on loan. Such a library should not be open to the general public but its use should be restricted to responsible persons connected with industries.

Reference libraries.

ORAL EVIDENCE, 6TH FEBRUARY 1917.

Note.—In the oral examination MR. F. STANES *represented Messrs. T. Stanes & Co.*

Sir F. H. Stewart.—*Q.* What is your principal business?—*A.* I suppose our largest department is in connection with the spinning and weaving companies. We are also connected with coffee and tea on the Nilgiris and surrounding hills.

Q. You use wood in your mills here?—*A.* Yes.

Q. Have you tried coal?—*A.* We have tried coal at an outlying factory 20 miles from here, because it is cheaper to cart it, but it does not compare favourably here. We have tried liquid fuel, and probably if it were not for war conditions, it would work out cheaper than wood fuel.

Q. Wood is cheaper than coal?—*A.* Yes, so far as the price of the wood goes, but it is more difficult to get.

Q. Have you any difficulty in getting labour now?—*A.* No, none whatever.

Q. Do you do anything yourselves to train your labour; it is entirely unskilled, I suppose, when it comes to you?—*A.* It is very largely a matter of practice in the mills. Then we offer prizes. We have not carried out the system to the full extent of Mr. Winter's written statement, but in the large mills we give prizes for the most satisfactory work.

Q. How many hands do you employ?—*A.* In the weaving and spinning mills we have got together nearly 3,000.

Q. Have you any system of apprenticeship?—*A.* No, we have apprentices, but it is not on any worked out system.

Mr. A. Chatterton.—*Q.* In regard to the question of generating power for the mills, has anything been done in Coimbatore to get the hydro-electric scheme developed for the supply of electric power?—*A.* I think there is a scheme before Government, but it has never come before us, and we know nothing about it ourselves. We have never been approached in the matter here. We hear stories of the scheme that Government has in view for supplying water and electric power to the town. Some years ago when the extension of the Cauvery scheme was taking place, Mr. Gibbs and Capt. Dawson visited Coimbatore with a view to enquiring into the matter.

Q. How much power do you use in your mills?—*A.* About 2,000 h.p. altogether in the different factories.

Q. You don't consider the fuel problem one of such urgency as to compel you to take any steps to try and find hydro-electric power yourselves?—*A.* Not immediately, I don't think. If the price of firewood goes up much more than it is at present, then perhaps.

Q. Where do you draw your supplies of firewood from?—*A.* From the Palghat forests.

Q. Is this obtained direct from the department or through the contractors?—*A.* Through contractors.

Q. What is the present price of firewood in Coimbatore?—*A.* It is Rs. 7-8-0 a ton of 68 c.ft.

Q. Is that a good quality of wood?—*A.* We have to select it; they sometimes bring in inferior wood, but on the whole it is satisfactory.

Q. In your reply to question 25 you state that the cotton that comes into the Coimbatore market is deteriorating in quality; what do you attribute this to?—*A.* Carelessness on the part of the ryot very largely in not selecting seed and taking no trouble about cultivation.

Q. Has the organisation of the Agricultural Department for supplying seed not extended to these districts?—*A.* It has to a certain extent, but I don't think the ryots realise it at all. They have not taken the trouble to get the seed, and I don't think the Agricultural Department have sufficiently pushed it. The original "Cambodia" was intended to be a garden cultivation. They found afterwards that it would grow as ordinary cotton would, and it was sown broadcast.

Q. The area under Cambodia is increasing?—*A.* Yes.

Q. That is without irrigation?—*A.* Yes, but a very limited quantity now is under irrigation.

Q. Does the cotton under irrigation fetch a better price?—*A.* They don't trouble to keep it separate, except when they want to select for some purpose of their own. They do try and select some for seed purposes, but when it actually reaches the market it is all mixed together.

Q. There has been a great increase of local ginneries?—*A.* Yes.

Q. And they work satisfactorily?—*A.* I think so, yes.

Q. Are there many presses in this connection?—*A.* Only one working at the present time at Tirupur; there is one being erected at Coimbatore at present.

Q. What is that for, exporting cotton from this district?—*A.* Yes, it belongs to Messrs. Volkart Bros.

Q. You have some remarks regarding the official organisation which you think is necessary for a Department of Industries in this province, and you suggest the establishment of a Board of Industries under the presidency of the Director of Industries, and you consider that this Board should be of an executive character. Who do you contemplate should be members of this Board? You specify the kind of men that you require, but do you mean that they should all be Madras men, or do you want the industrial towns represented?—*A.* Yes, I think so.

Q. How often do you think this Board ought to meet?—*A.* I have not thought it out to that extent, but as often as necessary.

Q. If you have business men on a Board of this kind, and have executive functions entrusted to them, they will have to meet frequently, and there would be considerable difficulty to get men from Madura to go to Madras?—*A.* I suppose so. A head of a department cannot always be spared from his department.

Q. Do you contemplate that the members of this Board should receive any kind of fees or remuneration?—*A.* I suppose they would expect something of the kind in order to compensate for the time they give to it. I cannot say that the details of the working have been thought of.

Q. If you have a Board composed of a number of business men, is it not likely that their respective interests might clash on the Board when they come to deal with matters laid before them?—*A.* Well, it is possible; the majority would have to carry the way.

Q. Under those circumstances is it not likely that the Department of Industries would be even less efficient than it is at present?—*A.* I don't know.

Q. You say that the Department of Industries is out of touch with the larger industries in the presidency. Has your firm ever made any application to the department for assistance?—*A.* Not to my knowledge.

Q. As long as the firms make no application, they are likely to be out of touch?—*A.* Yes, I suppose so; but the Department of Industries is more for the purpose of developing new industries. I don't know that the industries that are working well at present expect the Department of Industries to do much for them. It is more for the development of new industries that the Board would be required.

Q. Have you any idea that the Department of Industries might be so constituted as to be of assistance to your firm, or to people who are managing agents in a somewhat similar way?—*A.* I should think they could in some directions.

Q. Can you specify any directions that are likely to be of help to you?—*A.* I will have to think that over.

Q. Have you any schools connected with your mills in which the half-timers receive any education?—*A.* There is a municipal school for half-timers who attend the mills. We offer prizes for regular attendance at it.

Q. Does your firm take any special interest in this particular branch of education?—*A.* Not beyond offering them prizes for regular attendance. The school is run entirely by the municipality.

Q. Is there any committee of management?—*A.* No.

Q. What percentage of your boys who are half-timers actually attend this school?—*A.* I don't know, but it is very small. They are very irregular in attendance too.

Q. You say in reply to question 45 that the only step that could be adopted to improve the efficiency of the workmen is that of "sectionizing a mill or workshop and paying a bonus for output." Do you think that education among mill hands would have any effect in improving their efficiency; have you any experience in that direction?—*A.* I am afraid not. I suppose a general knowledge would make them more efficient.

Q. Have you observed whether the municipal school has produced any definite results among your own mill hands?—*A.* None whatever.

Q. Then you say, in reply to question 28, that commercial museums "are useful and instructive". Is that answer framed in reply to any definite experience in your firm, or is it a general opinion?—*A.* A general opinion, that is all. There is no commercial museum here.

Hon'ble Sir R. N. Mookerjee.—*Q.* With reference to questions 17 and 18, you say that the Government expert "should receive an interest in the benefit derived in the form of a bonus." Who pays the bonus, and who decides what bonus should be given?—*A.* The bonus would have to come out of the profits.

Q. These experts are Government servants, of course, will they have a free hand in receiving bonuses from any private firm?—*A.* It would have to be arranged. I suppose Government having lent the services of the expert, any payment would have to go through the Government presumably.

Q. Then any bonus given by a private industrial firm is to be sent to Government first?—*A.* Presumably Government having lent the services of the expert and a satisfactory result resulting, Government would have knowledge of the whole thing, and the Government sanction of a proportion of profits in the form of a bonus would help and would be workable.

Q. But the profits would come afterwards, not instantly as soon as the work was done?—*A.* Necessarily the bonus would have to be dependent upon success.

Q. So he will go on getting this bonus year after year?—*A.* I should think so; some workable scheme of that description might be formed.

Q. Not a bonus in a lump sum because he has discovered something which would be useful to your firm?—*A.* Yes.

Sir D. J. Tata.—*Q.* A sort of royalty you mean?—*A.* Yes.

Hon'ble Sir R. N. Mookerjee.—*Q.* You say in reply to question 44, "the maistry or jobber or overlooker of this section to be paid a prize on the aggregate output of the section." Is that the custom in your own firm?—*A.* We reward jobbers, we give them prizes in money. We have not carried it out to the full extent so that each member of the section benefits. The jobbers do.

Q. What you recommend here you have not carried out?—*A.* No, we hope in due course to be able to carry it out.

Q. You think that industrial schools should be developed under compulsory free education and under municipal control; should these be for factory boys, or for all men of that class?—*A.* We are thinking chiefly of the employers.

Q. Won't it be hard for them and not for the others; would it not affect your factory labour that way?—*A.* I should not think so.

Q. You said, in reply to Mr. Chatterton, that it is very difficult to get boys to attend regularly, and if you make it compulsory don't you think it will affect your labour?—*A.* It would be in their overtime.

Q. But that system of compulsion will not interfere with your getting sufficient labour?—*A.* I don't think so at all.

Q. What objection have you got to open the library to the public? Is it because it will be difficult to find out who should and who should not be allowed access to it, and who would have the power to decide? If I went there would I have to give evidence that I am an industrial man before I am allowed to see the books?—*A.* I should think the librarian would only be allowed to issue them.

Q. Don't you think that would give him a good chance of blackmail?—*A.* No, you can abuse anything. The only thing is if you open the library to the public, most of the books would be out with the public, and the library would not serve the purpose for which it was intended.

Q. It would do if you subscribed among your own industrial community, not when the Government has started the library?—*A.* If there was a small subscription the industrial men would subscribe. If the library was intended for that purpose, what is the use of throwing it open to the public.

Q. Practically it will be very difficult to draw a line?—*A.* Government can do these things if they wish to.

Sir F. H. Stewart.—*Q.* How do you recruit your labour by contract, by sardars?—*A.* In our coffee works, for the labour we require there, we do it by contract, but for the spinning mill we never have any difficulty. They just come along. Of course the force has increased by degrees, the mill has grown. In the early days there was no difficulty in getting them, and they have increased in numbers.

Mr. A. Chatterton.—*Q.* Are these hands taken on through gangers?—*A.* Yes, they are brought in that way but it is not a regular contract system.

Q. Then you pay individual wages to the men or to the gangers?—*A.* We pay the men.

Sir F. H. Stewart.—*Q.* Do you have labour troubles here—strikes?—*A.* Not for a good number of years. There was a small strike some five or six years ago, but the cause of that was due more to bad management; it was not the labourers' fault.

Sir D. J. Tata.— *Q.* How many cotton mills are there in Southern India?—*A.* I could not say accurately myself, but about a dozen.

Q. Are they spinning and weaving combined?—*A.* Most of them are only spinning.

Q. Any weaving mills?—*A.* Of course the Buckingham and Carnatic are weaving; those are in Madras.

Q. Further south, there are very few weaving mills?—*A.* We ourselves have a certain amount of weaving.

Q. Your yarn goes to the handloom weaver principally?—*A.* Yes.

Q. Is there a great demand for it among the handloom weavers?—*A.* Yes.

Q. What is the highest count you spin here?—*A.* 44's.

Q. Do you get your cotton locally, or do you import it?—*A.* Mostly locally. A certain amount is imported from western districts.

Q. What cotton do you use for the coarser counts?—*A.* There are low grade cottons in this district as well.

Q. Your labour is mostly local, and not imported?—*A.* All local.

Q. Have you any female labour as well?—*A.* For reeling only.

Q. Do you have for your looms a particular class of handloom weavers who come in and work for you?—*A.* When we started our weaving we had to import weavers from Madras to start them off, but the others soon picked up the work. We have some of the handloom labour who come in by degrees, but they would not in the beginning. I suppose it was prejudice.

Q. You say that you have had no strikes. That means you find the labour satisfactory?—*A.* Yes, if they are properly handled, they are quite satisfactory.

Q. All your raw material comes from the immediate neighbourhood?—*A.* Nearly all. There is a certain amount of cotton imported from western districts.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* You suggest control of fuel; what do you mean by "control" of the fuel by Government?—*A.* The Forest Department, I suppose, could control the growth and distribution of it.

Q. Distribution only to industries and not to other people?—*A.* I don't know that I could lay down the law for that, but I think it might be controlled. It seems as if the fuel supplies of South India will be worked out, and surely that is not necessary. That is for the Forest Department to reply to.

Q. I want to know about the control; is it to protect the forests for the industries?—*A.* As far as possible.

Mr. C. E. Low.—*Q.* With reference to Sir Fazulbhoy's last question, do you mean that you wish the industrial supply eliminated from the competition of domestic and other demands?—*A.* There is a class of fuel which is quite suited for domestic purposes but is not suited for commercial. We have to limit the size of our fuel. We cannot take small stuff.

Q. Where do you buy cotton, where do your buyers stand and buy; do they go into the market or into the villages?—*A.* The sellers come to our office.

Q. The cultivator or the middleman?—*A*. The middleman generally, very often the ginner.

Q. Any cultivators?—*A*. Some of the bigger cultivators who have got their own ginneries.

Q. Is it a sort of co-operative arrangement?—*A*. No, the big man himself; as a rule it is the middleman who does all that.

Q. About how small a lot is it worth your while to buy?—*A*. Ten Madras candies and upwards.

Q. Are there any markets here organised cotton markets?—*A*. No, there is a market in Tirupur which is a centre more or less, but it is not an organised market. There are a great number of buyers. The middleman does all the collecting.

Q. Even there the cultivator does not bring it in?—*A*. No, there are very few of them.

Q. Why do they not bring it in?—*A*. I expect for a good many reasons. They are too small for one thing, probably not sufficiently independent financially, and not up-to-date enough.

Q. I take it that there is always about the same number of men in most parts of India so indebted that their crops are pre-engaged, and also there is a great number of people whose crops are not pre-engaged. In many parts of India the cultivator brings the crop directly to the market and there sells it. That never takes place here?—*A*. No.

Q. I mean the sight of a dozen carts belonging to a cultivator coming into the market in the morning would be something entirely out of the way here?—*A*. Yes.

Q. Do you buy nothing but lint, or do you buy kapas also?—*A*. Stanes & Co. do ginning themselves, and in such cases we buy kapas, but as a rule we merely contract for the lint.

Q. From other people's gins?—*A*. Even in the case when we gin ourselves, a contractor will bring in his kapas. We buy the lint and he takes the seed away.

Q. And he pays so much for ginning?—*A*. Yes.

Q. What is your ginning charge?—*A*. About Rs. 6 per candy of 500 lb.

Q. You say you have got a local short-staple cotton here as well as your Cambodia?—*A*. Yes, it is the old cotton which has been gradually ousted by the Cambodia. The trade name was Salems.

Q. What is the ordinary margin in price per candy as between good Cambodia and the local short staple?—*A*. Anything from Rs. 30 to 50 a candy of 500 lbs.

Q. You get a good deal of mixed stuff you say?—*A*. Yes.

Q. Is that mixed by the cultivator or by the middleman or ginner?—*A*. It is very largely mixed by the cultivator. He does not take the trouble to keep them separate as he picks them from the field.

Q. Does the average cultivator grow more than one kind of cotton?—*A*. It is grown mixed in the ground, I mean the mixed Cambodia.

Q. I thought I understood you to say that one kind was grown as garden crop and one as field crop?—*A*. Some is grown in the open field and some as garden crop. He does not mix the old stuff, the Salems with the Cambodia as a rule.

Q. Does anybody else do that for him?—*A*. I don't think it is largely done. They are all capable of doing it, if it suits their purpose.

Q. Do you sell the seed from the gin or is it taken away by the men?—*A*. It is taken away by the men who contract.

Q. Is it possible to ascertain by examination whether it is mixed Cambodia or one kind or the other in the kapas stage?—*A*. Yes. The seed is quite different. The Cambodia seed is a big seed; even in ginning it is immediately noticed because you have different sized grids.

Q. It has been suggested by various authorities that in order to prevent mixture in the gins that a system of licensing gins should be provided which should make the gins liable to penalty if they disobeyed certain prescriptions with regard to keeping the seed unmixed or the selling of seed mixed. What is your opinion of that idea?—*A*. I don't think that there is scope for it here, because I don't think the mixing does take place in ginneries here so much.

Q. You think it is mostly done by the ryot to start with, the ryot or the middleman?—*A*. I cannot say who, but it is not done while ginning.

Q. You say that quality here is deteriorating; what action do you think should be taken to try and prevent it from deteriorating?—*A*. Primarily I think the selection of seed and the disuse of inferior seed.

Q. How would you prevent that?—*A*. As they do in Egypt. They have a system there of only allowing certain seed. I think the Government could bring in some kind of Act which could forbid the use of indiscriminate seed, if they really mean to improve the class of cotton in this country.

Q. But where do these people get their seed from—from the ginneries?—*A*. Yes, from the contractors.

Q. Would it not be easier to purify the stream at its source; do you think it would be any good licensing people who sold cotton seed?—*A.* That might be a form of controlling the seed that is sold.

Q. It would be rather difficult to carry it down to small individual cultivators; how much cotton does the average cultivator produce?—*A.* I don't know. Some little men would only produce two or three candies, perhaps upwards; some are very small.

Q. He brings in three or four hundred pounds of cotton at a time?—*A.* Yes.

Q. Have you seen anything laid down in the district to your knowledge by the Agricultural Department in the way of sale of seed?—*A.* The Agricultural Department offer to supply seed, but there is no pushing it among the natives. Much could be done in that way.

Q. Do you know how they arrange the sale of this seed, and how they offer it for sale in the villages?—*A.* I don't know the exact working of the Agricultural Department.

Q. Do you know if there is an agricultural association or sub-association in this district?—*A.* Not to my knowledge, not amongst the ryots.

Q. You are not a member of it, if there is one?—*A.* No.

Q. Do you know how many agricultural assistants are at work in this district offering seed for sale, or explain to the cultivator the advantage of it?—*A.* I have not met any of them.

Q. You don't seem entirely in touch with the working of the department yourself. Could you explain in what way the Agricultural Department could adopt a more active policy in this respect. Do you think more staff is needed to enable them to do more of what they are doing at present?—*A.* They started all right, but it is not sufficiently widespread, and what is needed is more of what they are doing at present.

WITNESS NO. 256.

MR. C. E. C. FISCHER, *Principal, Madras Forest College, Coimbatore.*

WRITTEN EVIDENCE.

Surveys for industrial purposes.

Q. 25.—Yes! A much more detailed and precise knowledge of the distribution of commercially useful forest trees and plants than is at present available is very necessary.

Q. 26.—By the appointment of special research officers (as suggested below) and by a closer co-operation with the Botanical Survey of India.

The special object in view would be to obtain exact information, not so much of the botanical distribution of each species, but rather of its commercial distribution. That is to say, of the limits within which it is found in such quantities and of such quality as will assure its successful commercial exploitation.

Q. 27.—By the publication and distribution of monographs with full information and by the creation of an information bureau, as proposed below.

Commercial museums.

Q. 29.—There is already a forest museum at Coimbatore which should be further developed and partly rearranged with a view to affording the fullest commercial and industrial information. The catalogue of the museum should be readily available to all interested in forest products.

Technical and scientific departments.

Q. 64.—There is urgent need for the creation of a research branch to the Madras Forest Service on lines similar to those of the Forest Research Institute at Dehra Dun. The research officers could be attached most conveniently to the Madras Forest College at Coimbatore, where there is already a well-found and developing forest museum and a large laboratory.

The research officers I would recommend are —

1. A forest economist.
2. A sylviculturist.
3. A botanist (ecological).
4. A zoologist (mainly entomologist).
5. A chemist.
6. A commercial expert in charge of an information bureau.

The existing research institute at Dehra Dun cannot cope with the demands of the whole of India and if the interests of the Madras Presidency in this respect are not to be shelved for an indefinite period a local research institute is imperative.

Q. 65.—The first three officers suggested in the last paragraph should be trained foresters, as a knowledge of sylviculture and experience of forest conditions is essential. These three posts must be provided for, therefore, by an increase in the cadre of the Forest Service.

The zoologist and the chemist, I consider, should be recruited by the direct appointment of experts in those sciences.

The commercial expert should be primarily a business man with experience of business methods and requirements. He should maintain a close touch with the markets and with industrial concerns interested in the raw products of the forest.

He would serve as intermediary between the research officers proper, especially the economist, and the manufacturers or consumers. It would be his province not only to make the results obtained by the research officers available to the business and industrial world, but to indicate to the former the direction in which further research is desirable and the form in which information is to be prepared.

The whole institute must be under the presidentship of a Forest Officer of experience, who will be in a position to co-ordinate and direct the efforts of all the specialists.

Co-ordination of research.

Q. 74.—Yes, I think so.

It seems to me that this could best be secured by the institution of a provincial Board of Scientific Advice of which the heads of all research institutes and of all scientific departments would be members.

Reference libraries.

Q. 79.—The catalogues, and the periodical lists of additions, of all libraries from which books of reference may be borrowed should be furnished to all research institutes, and may also be made available to industrial concerns where possible.

Forest Department.

Q. 106.—The forests require to be opened up by roads and modern means of mechanical transport.

Q. 107.—This has already been done in a few instances, e.g., the teak plantations of Nilambur. It would be possible, no doubt, to create other successful plantations, but they are apt to be very expensive and require additional establishment. Their justification lies in assured demand at remunerative prices. Plantations in selected localities of *Bombax malabaricum* for tea-boxes and packing cases might prove successful.

Q. 108.—The question of the deficiencies in forest transport has already met with official recognition; the slow progress is due to shortage of officers and the lack of funds. A more generous expenditure on well considered schemes would undoubtedly prove remunerative in a very short time. In addition, I would recommend that suitable officers should be encouraged to study what is being done in this direction in other parts of the world, either by being specially deputed or by financial assistance when on leave

This recommendation applies not only to the study of methods of transport but to all other branches of forest work.

Supplementary answers to questions.

Q. 17.—The loan of Government experts should be given to the full extent that circumstances permit. It would depend on the particular circumstances of the case whether the firms or companies should be called upon to pay for this expert assistance. For instance, in the case of a new company starting a new industry the assistance might be given gratuitously; whereas a well-established firm requiring advice could justifiably be called upon to contribute actual expenses and, in certain cases, an expert fee in addition.

Q. 18.—The procedure here again would depend on the circumstances of the particular case. Ordinarily Government should be at liberty to publish for the general good the results obtained by its experts. But this should not involve a betrayal of any trade secrets to the sole possession of which the firm concerned is genuinely entitled. I would have each case decided on its own merits.

Q. 24.—This might well be undertaken by the Imperial Board of Scientific Advice

Q. 40.—If Government supplies the raw material on favourable terms, e.g., wood or bamboo for wood pulp, there should be some official control or supervision to ensure that the business is being properly run. Otherwise there is the danger that the concession might be used merely to secure a monopoly, or else that the venture may turn out a failure through inefficient management when it might have been a perfectly sound proposition if well directed.

Q. 56.—As far as industries dependent on the forests are concerned, and especially from the forest point of view, the organisation is practically non-existent. The most important work of the Forest Service is of a highly technical nature and a technically trained officer at the head is a very necessary step towards a better state of affairs. I understand that the necessity for a Chief Conservator for the Madras Presidency has been admitted, but that the actual creation of the post has been deferred owing to the war, or for some other reason. I am of opinion that the post should be created forthwith. It is impossible for a layman to arrive at a correct view of technical questions. No untrained officer would be allowed to decide technical points in engineering and there is no reason why forestry should be put on any other footing.

Q. 78.—The difficulty has been a want of knowledge as to where the particular scientific work required is to be found. If one is faced with the probability of having to address a number of libraries, possibly without success in the end, one is apt to do without.

Q. 102.—I have no technical knowledge of hydro-electric installations and cannot of course appreciate all the difficulties, but it seems to me that there are immense possibilities in this direction. There are numerous places in the hills of this Presidency where water could be used for developing power. I believe that there is no insuperable difficulty in conveying electric power over considerable distances, indeed this is already being done. If several large power stations were to be erected at suitable points most of the industrial centres could be supplied. At present a very large quantity of wood fuel is consumed for industrial purposes; this results in high prices and even in shortage of fuel. I believe that this is actually the case in Madura. Electric power would set free, therefore, a large quantity of wood fuel for domestic purposes and the price would fall automatically in consequence.

Q. 113.—The stems of the cotton plant, and possibly of some other crops, which form waste material at present, are very suitable for paper-making. Probably a considerable number of the woods for which at present no use can be found would be suitable for wood pulp.

ORAL EVIDENCE, 6TH FEBRUARY 1917.

Sir F. H. Stewart.—*Q.* You belong to the Forest Service?—*A.* Yes.

Q. You are the Principal of the Forest College?—*A.* Yes

Q. When was the college started?—*A.* It was started in July, 1912.

Q. Was there a forest college in this Presidency before?—*A.* There was no forest college for the training of range officers. But we had in 1905-06 a sort of class for the lower subordinates. That was attached to the office of the Conservator of this circle.

Q. Is your work entirely training and teaching, or do you do any research work?—*A.* I cannot say that we do any research work at present.

Q. What is your staff?—*A.* We have two Imperial Service Officers and two Provincial Service Officers besides myself. And then there is a Curator of the Museum.

Q. The Provincial Service Officers are they Europeans?—*A.* They are both Anglo-Indians at present.

Q. How many students have you at present?—*A.* We have just at present 58 students. We take in 33 students at the beginning of each year. The course is one of two years.

Q. Have you room for all the students?—*A.* Yes. I should consider it inadvisable to take in any more because you cannot deal with a class of more students. I should consider that 30 is the maximum number that can be tackled.

Q. Are the students in Government service already or are they private students?—*A.* Two-thirds of them are in the British Government service. The majority of the others are either in the service of or deputed by Native States or by Ceylon and two or three are private students.

Q. You say in your answers that a much more detailed and precise knowledge of the distribution of commercially useful forest trees and plants than is at present available is very necessary. What would be your way of going about that work? Would you require more staff?—*A.* We certainly want more staff. We should like to have a special officer. There is an officer at present who has been recently appointed and who is doing more or less what I have suggested.

Q. Who is that?—*A.* Mr. Alfred Lushington.

Q. Can one officer deal with the whole question?—*A.* The staff will of course have to be increased in course of time.

Q. Do you recommend the development of the forest work on the commercial side?—*A.* I do.

Q. You make certain recommendations in regard to that. Do you want a commercial expert to be in charge of the information bureau?—*A.* Yes.

Q. And you also think that there is urgent need for a research branch to the Forest Service in this Presidency?—*A.* Yes.

Q. Could you give your reasons for thinking that it is specially necessary in this province?—*A.* It is not specially necessary in this Presidency more than anywhere else.

Q. Do you think that generally speaking there is need for provincial research institutes?—*A.* Great need.

Q. You would have them apart from the Central Institute at Dehra Dun?—*A.* Yes What I mean is that local conditions differ so much in this country.

Q. You give the designation of the additional officers that you would be inclined to recommend. You mention a zoologist and a chemist. Whom would they come under? Would they be all members of the Forest Service?—*A.* I would have it on the same system as has been working in Dehra Dun.

Q. On the same lines?—*A.* Yes. For instance Dr. A. D. Imms. He was not a Forest Officer. He was a zoologist. He has now left.

Q. To what service did he belong?—*A.* As far as I know he was recruited directly from England.

Q. By whom?—*A.* By the Government of India for this special post.

Q. Your commercial man, would he be a member of the Forest Service?—*A.* I think that it would be preferable that he should be for this special billet.

Q. Would you be able to get a man of ability for work of this sort? He would not be able to rise to other posts in the service?—*A.* Yes. I suppose you could retain his services by giving him an incremental pay over a series of years.

Q. If this appointment were made, it would be a very important one. It is one for which the need is urgent?—*A.* I think so.

Q. In reply to question 106 you say that forests require to be opened by roads and modern means of mechanical transport. Is there any sort of engineering service attached to the forest service?—*A.* Within the last three or four years one officer was originally appointed for the whole of India. That was quite insufficient and then subsequently we had two or three special engineers appointed for the Madras Presidency, and at the present time we have actually one.

Q. In your opinion would two be sufficient for the whole of the Presidency?—*A.* I do not think that two will be sufficient for the immediate needs. But I presume that after some time two will be sufficient. If you recruited a large staff there might not be sufficient work for it after a period of years.

Q. You think that more men would be required at the start to get the thing in working order and that after that is done a small number will be sufficient to keep abreast of current work?—*A.* I think so. When all the construction work is done, the work then will be more or less advisory. In that case a small number would be sufficient.

Q. What would be the position of these engineers? How would you recruit them?—*A.* I am afraid I am not capable of saying how the engineers can be recruited.

Q. Would they be full members of the Forest Service capable of rising to the head of it?—*A.* They would not be able to rise up to the headship of the Forest Service. That will be quite impracticable. That will be worse than the present arrangement.

Q. You say "I understand that the necessity for the post of a Chief Conservator has been admitted and that the actual creation of the post has been deferred." What is the present organisation?—*A.* There are four Conservators who are entirely independent of each other and they are under the orders of the Forest Commissioner who is a Member of the Board of Revenue and who obtains his orders direct from Government.

Q. Is there an officer called the Senior Conservator?—*A.* The Senior Conservator is only senior in regard to service and pay. He has no control over the others.

Q. Is he in Madras as a rule?—*A.* I do not think so. Not necessarily. It has varied considerably. At present he is in Trichinopoly.

Q. Is the Member of the Board in charge of forests the proper and likely person who would be consulted by the Government in matters relating to the administration of forests?—*A.* At present a Member of the Board of Revenue is in charge of forests and has no technical training at all.

Q. With reference to the question of utilising the hydro-electric power sources in this part of the country, has any thorough survey been carried out in this Presidency by the Government?—*A.* I do not know. I have not heard of any.

Mr. A. Chatterton.—*Q.* In regard to the question of forest engineering that has been raised in your note, we have had a good deal of information tendered to us. We have been told that timber extraction is very difficult and that there are many problems connected with local transport that have not been properly worked out. Is that so?—*A.* There are a great number of problems connected with Indian Forestry that require to be investigated.

Q. Is it necessary to appoint a considerable number of forest engineers straight away? Would it not do quite well at the present time if we utilise the services of Public Works Engineers to deal with the ordinary engineering problems which crop up in the forest reserve areas?—*A.* I should think that a capable Public Works Engineer ought to be able to do quite well. There are no special engineering problems. There might be in a few cases.

Q. Have the recognized methods of extraction of timber in other countries been tried here?—*A.* I think that very probably a Forest officer would be capable of saying whether it would be possible to introduce the systems here or not.

Q. Do you know whether any of the Forest officers in the Madras Presidency have been deputed to study these things specially abroad?—*A.* I do not know of any Forest officer that has been deputed to study any question of transport. As far as I know nobody has been sent. I say that they should be sent.

Q. If this question of extracting timber were taken up in the Madras Presidency, have you sufficient experience of the different forests here to enable you to say how many [illegible] would be required? Is your experience mainly confined to this [illegible]?—*A.* [illegible] about half a dozen districts.

Q. Would it be necessary to put on a forest engineer in each district?—*A.* I do not think so. I think we could manage very well at least for a time with one man for each circle.

Q. That would mean four for the whole Presidency?—*A.* Four or five for the whole Presidency.

Q. You have been Principal of the Forest College here and you are stationed in Coimbatore itself for some time and you are fairly well-acquainted with the history of the work that has been going on here?—*A.* Yes.

Q. Can you tell us what happened to that scheme which was introduced in the Anamalais to get out timber? There was also a saw mill?—*A.* Yes. Near Mount Stuart. There was also a ropeway.

Q. How was that scheme engineered? Was it done entirely by the Forest Department?—*A.* Yes. It was done before I came here. That was done entirely by the Forest Department.

Q. Were there any difficulties connected with the working of it?—*A.* The main difficulty was this. It was run by water power and there was no water for half the year. The stream on which it depended ran dry for half the months in the year.

Q. And therefore they could not go on?—*A.* That is so.

Q. Was it not known that the stream ran dry for half the year?—*A.* They must have known that it ran dry.

Q. Is that saw mill still working there?—*A.* It is not working there. It is now working in Coimbatore. It has been sold to the industrial school here.

Q. And what has become of the ropeway?—*A.* That has been given up too. Everything has now to be brought down by cart.

Q. The result of this experiment in forest extraction seems to indicate that you want technically qualified men to deal with these problems?—*A.* I think so.

Q. In this district there is a very large area of forest, especially in the hills in North Coimbatore. Is there much economic produce extracted?—*A.* There is a good deal in the way of minor produce but not much in the way of major produce or fuel.

Q. Why?—*A.* You must have demand. There is not much big timber.

Q. We have this morning heard that the supply of firewood is not satisfactory and that the prices are rising and that most of the wood comes from Palghat forests. Is it not possible to get firewood out of the North Coimbatore forests?—*A.* I think the long lead would be prohibitive. It is a very long lead and it is entirely by road. You will have to take it all in carts.

Q. As regards the minor produce of the North Coimbatore tract, do you know how that is extracted?—*A.* It used to be mostly myrabolams and the collection was sold to contractors.

Q. That is assigned in areas?—*A.* The system varies. It is either sold by auction to contractors or collected departmentally by the hill men and brought into central depôts and then sold.

Q. Is it possible here through the agency of these hill men and the central depôts to obtain any special produce that may be wanted?—*A.* Any special produce that is required could be brought in.

Q. We could not get it through the agency of the contractors?—*A.* Yes, we could.

Q. Do you know if it would be a good thing to put up a plant for wood distillation in some area like North Coimbatore with a view to improving the forest produce and creating a demand for forest produce?—*A.* I think it would be. I do not know much about the processes and the cost. If that is a feasible arrangement, that would be an excellent thing to do.

Q. Assuming that it is a commercial proposition would it be to the advantage of the forest to introduce it?—*A.* I think it would be of very great advantage.

Q. You mentioned that myrabolams are largely sold from the North Coimbatore area. Have any steps been taken at any time to increase the supply of these tanning yielding plants? Or is it entirely left to natural production?—*A.* As far as I know it is left to natural production

Q. Would it be possible to establish forest plantations of this class?—*A.* I had the other day an enquiry regarding wattles and whether they could be grown and as a matter of fact we are just going to undertake a small experiment to go into the matter.

Q. These wattles are growing in the Nilgiris?—*A.* Yes.

Q. Is there any very large quantity?—*A.* There is quite a considerable quantity.

Q. Is it scattered?—*A.* Not very. You get it round about Ootacamund and Coonoor.

Q. Is it a practicable proposition to collect them?—*A.* I think so.

Q. Are there any areas specially planted?—*A.* Yes. They are being worked now for fuel.

Q. You mean the wattles?—*A.* Yes.

Q. Is the bark sold?—*A.* Not much.

Q. How long does it take to grow it so as to be a commercial proposition?—*A.* I have never served in the Nilgiris. Five or six years, I should think, perhaps ten years.

Mr. A. Chatterton.—*Q.* In many places we might take it that where you grow tanning yielding trees, the commercial prospects would be very much better if you combine it with the question of wood distillation?—*A.* I think so. Yes.

Q. You can then strip the bark for tanning purposes and convert the wood into charcoal?—*A.* Yes.

Q. You are beginning to make experiments in Coimbatore in connection with these wattles?—*A.* As a matter of fact, we have not begun. I have not yet got the seed.

Q. Where do you propose to plant it, in the plains or in the hills?—*A.* I am intending to do that merely as an experiment in the Forest College ground and another in the Bolampatti valley which is about 20 miles from here.

Q. There is another question on which you, with your experience, will probably be able to give us some information and that is with reference to the fresh increments annually to the forest growth in this part of the country. Have you any special knowledge about it?—*A.* I think that differs for each forest and for each locality.

Q. From a practical point of view, in these large forest areas, could we rely on the annual increment as being sufficient to supply large quantities of fuel, supposing they were wanted for industrial purposes?—*A.* Yes. It all depends on the quantity required and the area available.

Q. Could you give us any rough idea of what would be the annual increment if we work the North Coimbatore forests for instance?—*A.* It is impossible to say anything.

Q. Would it amount to a ton an acre?—*A.* Yes. It would certainly. It would even come to more than that.

Q. A ton per acre per annum?—*A.* No, but at the exploitable age.

Q. What steps should be taken to bring these forests up to the model bearing area?—*A.* Protection against fire and grazing.

Q. Are you troubled in these parts much by goats?—*A.* Goats are not admitted to the forests.

Q. Would it be a practicable proposition to extend the area of blue gums in the Nilgiris?—*A.* That would be quite simple.

Q. The hills round Coimbatore, would they carry blue gums satisfactorily?—*A.* Not in the low lying ones. Up in the higher ones, you can plant it all right.

Q. The position here and in other places seems to be this. Directly we make a considerable demand for firewood, the supplies fall off unless we take steps to have fresh supplies by having new plantations and the question is whether it is a practicable proposition to start fairly large plantations in anticipation of a big industrial demand during the next five or ten years?—*A.* The difficulty in the low-lying places is water and the heat in the summer. There is a long drought.

Q. Do you think it would be possible to start fuel plantations within a comparatively short distance of Coimbatore? I do not suggest the name of any particular tree?—*A.* I think that would be possible on selected areas.

Q. Could you tell at all what would be the probable price? Shall we be able to get suitable fuel at Rs. 4 to Rs. 5 a ton? Do you think that that is a practicable proposition?—*A.* I doubt very much whether it is possible at prices so low as that, unless you buy up land in the immediate neighbourhood of Coimbatore which is not Government land. From the nearest forest land you would have to spend from Rs. 2 to Rs. 3 a ton for merely carting it.

Q. Are there any areas of Government waste land round Coimbatore that could be planted up?—*A.* I do not know about the waste land.

Q. That is a matter that could be investigated?—*A.* Yes.

Q. You suggest here that Bombax malabaricum might be planted. Do you think it would grow suitably? Don't you want a fairly heavy rainfall?—*A.* That would not do in Coimbatore itself.

Q. Bolampatti is about the only place in the district where the rainfall is heavier than in the rest of the district?—*A.* It is fairly heavy there.

Q. Are there any very large areas suitable for Bombax malabaricum?—*A.* Yes.

Q. Where?—*A.* In North Coimbatore and South Coimbatore in the Anamalais. There is a considerable quantity along the slopes of the Nilgiris. It is also found in the Bolampatti valley.

Q. Would it be very expensive to extract this as a possible source of paper pulp?—*A.* I do not think that it would be expensive. But I understand that the difficulty so far is the difficulty of getting water either for floating or running a factory in the neighbourhood.

Q. Without the water it would be expensive to extract this?—*A.* It would be of course.

Sir D. J. Tata.—*Q.* In your supplementary note you say that Government ought to be able to lend the services of experts to the extent possible. Now, the Government expert is brought out to this country at the expense of the public. And the reason for his existence is that he should help the industries of the country, find out new processes and thus help to develop them. If his services are utilized by a private firm should not the results of his enquiries belong to the public also?—*A*. I think so, with the exception that if he has been told or learnt any special trade secret in the course of his work for the firm then that should belong to the firm; and I do not think that the public is titled to it.

Q. It is open for the firm to spend money themselves in bringing out the expert. they save that money by utilising the services of a man brought out at public expense, rely they are not entitled to the whole of the information supplied by the expert?—*A*. do not mean to say that the firm should be entitled to the whole of the information pplied by the expert.

Q. Would you limit the period during which the firm should have the benefit of e work of the expert?—*A*. I would limit it to a certain period. But I would not be favour of any secret of the firm being betrayed.

Q. For how long would you limit the period?—*A*. That I cannot say.

Q. It is open to the firm to bring out the expert at their own cost. But they utilise e services of a man who has been brought out at public expense. Even if the firm pays the expert a special honorarium, don't you think the results of his enquiry should elong to the public pretty soon?—*A*. I certainly think that the public is entitled to ny work done by the expert who has been brought out at public expense. At the same me I think that the interests of the firm should be safeguarded. Or else you limit e value of the expert. The firm will not engage the expert if there is any chance of eir secrets being betrayed.

Q. Of course there is the expert in this country, and the firm is saved the expense f bringing out another expert from home. For that reason, don't you think that the ecret should be only partially theirs, because the funds come from the public?—*A*. I ould not like to keep out anything special of the firm's that the expert has discovered. ut at the same time there is this point. He might have been given some information enable him to help the firm on a certain point and the question is whether the firm hould be safeguarded in that or not.

Q. In America there is an Association of the Universities. Certain problems are eferred to that body and they send out those problems to the various universities, and believe the limit there is three years. After a period of three years, the results that ave resulted from the researches are published in the journals of the universities who re carrying on the researches, and the results are then available to the general public. he firms that employ the universities have this special protection, that they have the esults three years in advance of the others. Don't you think that some such system ould be adopted in this country?—*A*. That sounds as a very feasible proposition.

Q. Turning to another question you suggest that the stem of the cotton plant could e used as a material for the manufacture of paper pulp. Has any experiment been done y the department in that direction?—*A*. Not as far as I know. That does not come ithin the purview of the Forest Department.

Mr. C. E. Low.—*Q*. You recommend provincial research institutes. If one province ets it then other provinces will want that also?—*A*. Yes.

Q. Burma will want one, the United Provinces will want one and the Central rovinces will also want one?—*A*. Yes.

Q. Don't you think that you will thus have four or five of each of the various ypes of experts per each different part of India, besides the central institute?—*A*. I hink the present system that has been at work in Dehra Dun is suitable. They issue a eport as soon as sufficient material is collected and that is distributed. The research nstitutes will get a copy and they will know exactly what is going on elsewhere. This ill prevent duplication.

Q. There has been some complaint about these publications. It has been pointed ut that inordinate delay is caused in the publication of the papers. The officers in he central research institute at Dehra Dun first send it to the Inspector-General of orests and he submits it to the Revenue and Agriculture Department of the Government of India. There it is delayed for a year or even two years. Do you not think hat such delays in the publication of papers should be avoided?—*A*. I do.

Q. How would you propose to do it?—*A*. I would avoid this delay by giving power the President or the Principal of the Research Institute to publish the papers on is own responsibility.

Q. You recommend that some research officers might be appointed in connection ith the local research branch of the Forest Service that might be started and you uggest that one zoologist might be got. Would he have any special terms? Would ou recruit him into the Forest Department?—*A*. I would recruit him into the Forest epartment and give him an incremental salary.

Q. Would you be able to get him on those terms?—*A*. I think so.

Q. You do not see many men in this country?—*A*. When I was working a few years go in London, I came across a good many zoological students. That is only one of the nstitutions there.

Q. Do you know what happens to them afterwards?—*A.* I only know of one. He has gone to some plantations in the Malay Straits.

Q. What sort of officer should the forest economist be?—*A.* He should be a member of the Forest Service.

Q. You mean with a certain amount of extra training?—*A.* Yes.

Q. Your botanist?—*A.* The same.

Q. The chemist?—*A.* He must be an outside man.

Q. And the commercial man?—*A.* He should also be an outside man.

Q. Do you think that this staff that you suggest is absolutely necessary?—*A.* I think so.

Q. In what way have you found the institute at Dehra Dun deficient?—*A.* Only in the respect that one such institute cannot possibly serve the needs of the whole of India.

Q. That everybody will admit. The answer to that would presumably be that you simply enlarge that institute and provide more staff. Are you prepared to give any specific instance to show that it is over-worked?—*A.* I am not aware of it. What I had in mind was this. Suppose there is a special problem. If it is to be done in the central institute, the man there would have no knowledge of the local conditions and he would take a longer time than if the thing were done locally.

Q. You then say that many of the problems can only be studied locally?—*A.* Yes.

Q. Do you think it would be advantageous to do so?—*A.* I think so, because the local conditions vary in the localities themselves. Forest growth depends very much on the local conditions. For instance take teak. You get in Nilambur totally different conditions of growth than in the Anamalais in South Coimbatore.

Q. Of course you realise that to have research institutes all over the provinces and a central one at Dehra Dun would be a very expensive thing?—*A.* Of course it would be expensive.

Q. Don't you think that a thoroughly well-equipped central institute could be run with a great deal less expenditure?—*A.* But I do not think it will be able to cope with the great amount of work.

Q. The position of a fair number of experts graded and working together in a central institute as that of Dehra Dun would probably be more attractive from many points of view and give better avenues for promotion and so on. That would be more attractive as a recruiting proposition than that of isolated people attached to the provincial departments with a less intensified research atmosphere and with prospects of an inferior nature?—*A.* That of course refers to those who are recruited outside the department. There is something in what you say. It is after all merely a matter of how the salary is fixed.

Q. That is not of course essential to your proposals. I recognise that. Supposing on the other hand you took your chemist from a sort of general chemical service for India and your botanist from the general botanical survey of India and so on and deputed them for fairly long periods for the study of various questions, how do you think a system like that will work?—*A.* That would work all right.

Q. In answer to one of the questions you said that the member in charge of Forests in the Board of Revenue or the Forest Commissioner controls the Forest Department? Does he pass orders on technical questions?—*A.* Yes.

Q. Even as regards working plans?—*A.* Working plans are sanctioned by him.

Q. Does he alter them in technical matters?—*A.* I know of one definite case where that has been done.

Q. Does he ask advice from some officer such as the Inspector-General of Forests?—*A.* I do not think so. I have never heard of that.

Mr. A. Chatterton.—*Q.* You agreed with Mr. Low that it might be practicable to draw your scientific specialists for the forest research work in the Madras Presidency from a central service. What I want to ask you is this. Assuming the existence of a very much enlarged central institute at Dehra Dun, would it still be necessary to have local research institutes in the various parts of India to deal with the local problems. Could they not be properly studied in the conditions which exist at Dehra Dun?—*A.* I think it would be much better to have local institutes. Suppose you take a man from the central institute at Dehra Dun to study the conditions in Madras. He would want to refer all his problems to the institute back whereas if you get an institute in Madras, whether you get a man locally or from the central institute he would have a laboratory near at hand and everything more or less in the province in which he is working.

Q. Would it be possible for the man to do his field work down here, take the experience back to Dehra Dun and work there?—*A.* That is quite impracticable. There would be a great waste of time. Suppose he gathers his materials and goes back and later on finds that he has got to gather some more material, he would have to come back again all the way from Dehra Dun. This would involve a great waste of time.

On the other hand if he were working in the Presidency itself, he would be able to come to the spot in a short time and find out the information he is in need of. You want local officers who would work locally knowing the local conditions.

Q. To what extent in developing the Forest College here would you be able to provide laboratories and other equipment which will also serve purposes of research?—*A.* We have already got a large laboratory. We have a certain amount of equipment part of which has been handed over to the agricultural chemist because we are not using it now.

Q. For your own educational work, you will have to provide comparatively well-equipped laboratories?—*A.* We do not need them at present, not until we get a higher class of subordinate officers.

Q. Should they be sent to Dehra Dun at present?—*A.* We cannot train any higher class subordinate until we have a local research institute. We could not deal with it until then.

Q. Do you think that the two questions of higher research and the training of forest higher subordinates is intimately connected?—*A.* Yes.

Q. In connection with the economic work of the forest department, do you know if there has been in the past any co-ordination between the Forest Department and the Department of Industries?—*A.* There has not been much co-ordination. We have generally looked upon any questions that have arisen from different points of view. That is to say the Industries Department naturally looks upon it from the point of view of developing the industries in general. We have generally looked at it from the point of view of starting some industry which will utilise our waste material.

Q. Take for instance the question of fuel supply about which I asked you. The Department of Industries are very much interested in it and also the Forest Department. Can you suggest any means by which these two departments can co-ordinate so as to work the problems that arise in the best way possible?—*A.* I think they could co-operate and this will be quite possible when we have a Chief Conservator. If either of them wants to get information from the other, it will be much more easy for the Chief Conservator to correspond and communicate with the Director of Industries and they will then practically issue the orders for further investigation to their own subordinates. At present so far as I know the intercourse is generally between the Director of Industries and some particular forest officer.

Q. That of course is a very unsatisfactory arrangement?—*A.* I quite agree. It has this one merit. The Director of Industries may obtain the views of an officer who is particularly interested. On the other hand, it may be that that officer may not be able to furnish all the information that may be needed.

Q. When the Director of Industries addresses a local officer, it may involve a considerable amount of time and consequent delay. The forest officer may not have the necessary time?—*A.* I think so. Of course what I am suggesting is that co-operation would depend on increase in the establishment. They could not carry out the work under the present conditions.

WITNESS No. 257.

DR. C. A. BARBER, *Government Sugarcane Expert, Agricultural College, Coimbatore.*

WRITTEN EVIDENCE.

Agriculture is the basal industry of India, alike in the Peninsula and the vast stretches of alluvium formed by the great rivers of the north, the Ganges, the Brahmaputra and the Indus. In it consists the main wealth of India, and its improvement will affect the great bulk of the people. It will have immediate influence on the many industries which are connected with it, as well as, indirectly, others not dependent on it, in that its improvement will give the people money to invest in them. I do not know whether the Industries Commission desires that Agriculture should be dealt with and I see no questions framed on it, but, besides the importance of the industry itself, it has its technical and scientific sides, and it is with the development of the young Department of Agriculture that I am chiefly concerned. I have accordingly prepared the following note on it, dealing especially with the research side, and trust that it may be of some use in emphasising the great advantages likely to accrue from an extension of scientific work in India, and in indicating some of the difficulties under which this work is carried on. I deal more especially with Madras, but my remarks apply in many respects to other Provinces, and I add some notes on the general organisation of the whole Department in India.

The Agricultural Departments of the different Provinces are quite separate, and they have little or no connection with the so called "Imperial" section whose headquarters are at Pusa in North Bihar. In Madras, there is a Director, at present drawn from the ranks of the Civil Service, who is subordinate to a Revenue Member of the Board of Revenue, who, in his turn, is under the Revenue Member of the Governor's Council. (Since writing this, a change has been made and the intervention of the Board of Revenue has been removed, the Director being placed immediately under Government). The work of the superior officers of the department may be classified under three distinct heads, district work, teaching and research. It will I think be unnecessary to point out that the previous training and mental outlook of the officers in these three branches should be very different. The district officers are in charge of the Circles into which the Presidency has been divided. Their work is largely executive; they have charge of a number of agricultural stations, with trained managers under them; they are responsible for the dissemination of knowledge gained as to improved methods and are in charge of the distribution of the seed of improved varieties of crops; for this work they have a suitable staff of trained men; they are supposed to study the agriculture of their Circles with the idea of obtaining knowledge and of effecting improvements whether on their own initiative or as the result of the work of the specialists in research Special officers have recently been entertained for engineering and cattle-breeding and one devotes his attention to planting districts. Teaching is practically confined to a Central College, and this institution is responsible for the preliminary training of the subordinate officers of the department. A district officer here deals with Agriculture generally and manages the large farm attached. Because of the important part he takes in the teaching and of his control of the local farm, Government has directed that the office of the Principal should be attached to the district officer employed. The various sciences are taught by specialists, in chemistry, botany, mycology and entomology. The latter officers are also supposed to conduct research in their respective branches. The Principal exercises no control over the specialists, each of whom is directly responsible to the Director. All the superior officers in the College have their appropriate staff of assistants, are entirely independent of one another and have separate offices and budgets. In the College, affairs are directed by a Board, consisting of the Principal and the specialists (or experts), each of whom is head of a section.

Considerable improvements have been from time to time introduced with regard to research, partly because of the increase in staff, but chiefly because of the appreciation of Government of the successful results which have been attained by the various experts themselves. My criticisms, while referring mainly to the present position of affairs, are to a certain extent retrospective, for there can be no certainty as to the exact attitude of future members of Government. Questions as to pay and prospects, leave and pension rules, governing officers of the department are not included in these, as they have been fully dealt with by the recent Royal Commission, and it is presumed are not wanted here.

I.—Specialisation of work.

When the College was started at Coimbatore there were only two experts attached to it, a chemist and a botanist, these being considered, at that time, all that was necessary for the conduct of the scientific side of a Provincial Agricultural Department. The latter officer was an active member of the Botanical Survey of India, his charge including the Peninsula with all its Native States. He had charge of the naming of the specimens collected and the upkeep of the already large herbarium. He was responsible for the laying out and upkeep of the Botanical Garden. He was Economic Botanist and had separate sections with assistants in Economic Mycology and Entomology. He was expected to deal with the teaching in these three subjects, and had to prepare separate courses in Botany and Agricultural Botany, and had the general supervision of those in the other two subjects. In the intervals of leisure he was expected to devote himself to research in Economic Botany. It is obvious that he was up against an impossible task, and much of his time was taken up in demonstrating to his superiors (chiefly the Member of the Board of Revenue) that fresh men were needed in order to deal efficiently with the work. After many ups and downs, these efforts were successful, and now a separate Economic Botanist, Entomologist and Mycologist, a teaching Botanist and a Sugarcane Expert are entertained, five officers fully employed in the discharge of duties which it was considered a few years ago could be conducted by one man. The Economic Botanist is now freed from teaching and is devoting himself chiefly to the study of paddy. The separation of teaching and research is complete in Botany. It is not so in the other sections, and I consider that, for the sake of efficiency, it should be, and this efficiency does not only refer to research but also to the teaching. I must point out that the conditions are peculiar in India in that the undoubted assistance which occasional advanced teaching gives the researcher is denied the expert here. The teaching in the College, although to a certain extent technical, is, once it is stereotyped, exceedingly elementary. It is not usual to find, in the same man, the power to conduct difficult investigations and to prepare clear and concise courses of lectures to elementary students. Much of the teacher's time should be spent in the laboratory, and it is inevitable that one or other of the two subjects will be neglected. I would, in fact, suggest the advisability of completely separating the teaching from research in different colleges. By far the greater part of the Agricultural College at [illegible] the research section, which are now fairly equipped for their work. [illegible] recommend that it be retained for this purpose, and that a new college [illegible] teaching elsewhere, which could be done at comparatively low cost. [illegible] opinion I have the strong support of Dr. Budding, Member for Research [illegible] Prussian Council, who visited the College in an official capacity [illegible] pointedly asked me whether we were attempting to combine teaching [illegible] Agriculture in the College and, on my answering him, he said, "We never [illegible] and research in the same institution in Germany."

II.—Freedom of the experts from administrative details.

All administrative work should be reduced to a minimum in scientific departments, while at the same time the head of each section should have complete control over the work being carried on. This will sound rather like a paradox to the ordinary executive officer, and it is certainly a very difficult thing to carry into effect. The rules for offices in Madras have been elaborated for the smooth working of administration; while a marvel of organization, they are quite unsuited for scientific workers, and there is a lack of elasticity, in that their application is in the hands of purely executive officers. The Government naturally desire to retain control, but this could I think be obtained without the close adherence to a system never intended for this class of office. The researcher should, I think, be made as free as possible, within the limits of his budget to carry on his work as he thinks fit. One of the improvements I would suggest would be the formation of a common office for the suggested Research Institute. This should be quite possible, once the teaching is separated, and it has its own representative head. In this common office most of the routine periodical returns, which are still considered necessary, could be prepared, and the details of stationery indents and those for various other stores could be worked out. But another leakage of energy of importance is in the harassing details of running a heterogeneous office with many grades. There is inevitably much more of this class of petty interruption than in an English Institute. This could be greatly diminished by the addition to each office of a competent scientific assistant as manager. He would be in general charge of the staff and would carry out the arrangements regarding distribution of work and touring as directed by the expert, and the latter would then only have to deal with his own scientific correspondence, and one clerk should be quite sufficient for that work. This is practically the result I have come to in my own office, after many years of scientific work in this country and the Colonies. The position of the Principal in the College is at present anomalous, in that he is no way representative of the important science section and is comparatively junior, and such being the case, I do not think that the formation of a common office under his charge is feasible.

The preparation of reports is a matter requiring a greater degree of latitude. As a concrete example, although in several respects my own position is peculiar and certain returns are not required of me, there are nearly 100 which have to be prepared and sent in to the Director every year from mv office. The sending in of progress reports is included in these. They are due to the natural desire on the part of Government to know that work is being steadily carried on. Besides monthly and annual reports to Government, there are others to be prepared for the Board of Agriculture and the Board of Scientific Advice and on special occasions. These are not suited to research. While in favour of the retention of the annual report (which should be sufficient for the two bodies mentioned above), as a general summing up of the position, I may be excused for again quoting the interesting conversation which I had with Dr. [illegible]. Without any prompting on my part, he asked me whether we sent [illegible] of our work to Government. He then made the following remarkable admission: [illegible] require any researcher to send in reports. Our method is as follows. [illegible] arises, we select our man, give him what he asks for in money for [illegible] equipment, within reasonable limits, and leave him alone. Even [illegible] report for five years, we do not worry him. We know that he [illegible] publish any results that he is able to obtain and we quietly wait [illegible] and future will depend on what he finds out". This is worthy of [illegible] deliberate policy of a nation where the organization of research is the [illegible] world. Periodical reports during the progress of an investigation [illegible] to be deprecated, and in this matter the opinion of the [illegible]. Anything in the nature of premature [illegible] and unscientific.

III.—[illegible]

[illegible]

discontented officer. There is no help for this, and it is impossible, in the nature of things, for Government to be able to determine whether an officer is really doing his best. This has been largely lost sight of in the past, and much trouble has been caused by a lack of understanding on the part of his superiors of the expert's point of view. Efforts have, indeed, been made by the Member of the Board of Revenue, rigidly to parcel out the hours of a working day at the College. The main principle which we have been fighting for during the past ten years is freedom from official control as to the character of our work and the methods by which it is carried out. Once a problem has been presented to a worker, he should be left as free a hand as possible as to the way he attacks it. That this has not been the case in the past may be seen from the following extract from a Board's Proceedings "As regards research, in order to prevent any risk of time being wasted, the objects for which 'research' is to be devoted should be specified and sanctioned beforehand by the Director of Agriculture, and the general scope and trend of the method which it is proposed to employ should be laid down in each case. The Director should require the submission of periodical reports, and care should be taken that research is both a reality and devoted to practical ends. To this end, definite instructions for the guidance of the Professors should be drawn up and submitted to the Board by the Director". I think that all experts will agree that it is impossible to carry out these orders in doing good work. The general scope and trend of methods will, in many cases, vary from time to time as the work progresses, and it is also inevitable that "much time will be wasted" as regards the immediate object in view by the following up of clues and side issues, the value of which cannot be decided until the results have been obtained and collated. Periodical reports during the progress of the work have been already referred to as dangerous and unscientific. Many valuable results will require repeated testing even after the worker is sure of them in his own mind, and it would be easy for the Director to convince himself of the state of progress in any line of investigation or research, by informal conversations with the worker. As to the "reality and practical ends", this is difficult to define or control, and it is a cardinal principle of research that work should be unfettered by any considerations of utility. This should only be guarded at the commencement, when the problem is given to the expert, and the value of his work should not be exclusively judged by its immediate practical application.

IV.—The nature of research.

As there appears to be so much misconception as to the subject, I am tempted to devote a paragraph as to the nature of the work to be done in Agriculture. This is the more necessary, because little attention has in the past been paid to the separation of officers best suited for district work, teaching and research itself. This grave duty rests with Government, and it is merely mentioned here because it is unfair to expect good research from a man not fitted naturally for it. The remedy lies in greater care in selection at the outset, but more so in the increase in the number of officers recruited. As will be seen, there is plenty of work for all, but the present method of placing a new recruit in an office where he is expected automatically to continue the work of his predecessor is unsound, and leads to great inequality in the work produced. It must be remembered that India is in a totally different stage of development to that of the place where the experts come from. There is far more spade work to be carried out in preparation for research than in Western countries. I am tempted to divide the work under three headings, namely compilation, investigation and research proper. Much of the work turned out at present comes under the second head and, for many years to come, it will perhaps be the main line of work for the officers recruited by Government.

Compilation.—Details of previous work lie scattered all over the country, usually filed in various executive offices, which are the result of the spasmodic and individual efforts of workers during the past fifty years. Much of this work is of considerable value, and it is important that, before it is too late, it should be disinterred, sifted, put together and, where desirable, published. Besides this, it is desirable, every now and then to group the results obtained on any important head and issue a reasoned statement of progress. This spade work would form the basis for a fresh start, and such compilations would be of value to workers on sugar matters, green-manuring, alkaline lands, analysis of soils and so forth. Several attempts in this direction have been made during recent years by the Agricultural Adviser to the Government of India, and he appears to have placed them in the hands of successive personal assistants. Their preparation requires a good scientific or technical training and a good style of composition.

Investigation.—This is perhaps the main line to be followed up at present in this country, and should, to a large extent, precede and prepare the way for research into definite problems. Our knowledge of the country is, and must be for many years to come, extremely limited, and much time can be usefully employed in increasing it. As examples, I would suggest a careful survey of the crops in different geographical regions, summaries of methods of cultivation of the same crop under different conditions, descriptions of the different implements employed with notes as to their relative effectiveness, classification of soils and soil surveys, and so forth. These pieces of work could be carried out by any one with a scientific or general agricultural training, according to the subject. At present, the work of the researcher is considerably handicapped by having to make these preliminary enquiries, and often the work produced is overloaded with unnecessary details.

Research.—This is, of course, much more difficult to define, but consists essentially of new lines of thought or work, additions to knowledge, whether the result of experiment or inductive reasoning, and the application of this knowledge in new directions. It is something original and individual, and its character will depend entirely on the class of mind of the officer engaged. I need not dilate on the truism that "the researcher is born and not made", but I would emphasise the fact that, of the specialists engaged by the Agricultural Department, comparatively few will be fitted for research work, and it is the function of Government to discover them, and allow them free scope for their usefulness. If this sub-division of agricultural work be held in view, it is obvious that there is plenty to do for all the scientific officers entertained and, indeed, it opens up a vast field for additional workers as the department increases its activities.

V.—*The Imperial Agricultural Department in India.*

This consists of departments in Madras Bombay, the Central Provinces, Burma, Assam, Bengal, Bihar and Orissa, the United Provinces and the Punjab. A separate section has been established at Pusa in North Bihar, directly under the Government of India, and its chief officer, the Agricultural Adivser, is generally recognised as the chief of the whole department, and he visits consultatively all the Provinces. At present all these departments are entirely separate and, in the majority of cases, have little to do with the section working at Pusa. It becomes a question whether any closer union is possible or desirable.

My chief criticism of the present arrangement is that too little attention has been paid to the definition of agricultural tracts as contrasted with political divisions, and that, for an Institute dealing with the whole of India, the location at Pusa has been unfortunate. As to the former, where the geographical (and agricultural in consequence) conditions are distinct, I do not think that any closer union will be of advantage at present. The problems are purely local, and the officers entertained have plenty of work to do which they alone are in a position to carry out. In other parts, great contiguous tracts have similar conditions and a certain amount of fusion may be desirable. Madras and Bombay are separate regions, have promising and energetic young departments, and may for the present be left alone. Burma is another separate section, but the department here, as indeed agriculture itself, is only in an elementary stage. The Central Provinces consist of several sections, differing sufficiently widely, resembling in turn the United Provinces, Madras and Bombay, but the population is sparse and agriculture very backward, and the local department is doing very useful work. Bengal is a great country with varying conditions, which might with advantage have several departments, but there are special difficulties, and the department is undergoing a process of reorganization, and it would be well to note the result of this. It is obviously terribly understaffed, and has not been very well managed in recent years. Assam is a small and heterogeneous Province with a small staff alternately devoting itself to the problems in the different tracts. It is a question whether the Sylhet section might not be merged in Bengal, but the Brahmaputra valley and the hill tracts have purely local conditions and problems. Bihar and Orissa is again a heterogeneous region and it is a question whether Orissa should be attached to Bengal, Madras or the Central Provinces. Bihar passes into the United Provinces and these again into the Punjab, and I consider that these Provinces together with the Institute at Pusa, which has become largely Provincial in its work, would, with advantage, be merged into one great whole. The agricultural conditions and the problems to be solved are largely similar, although there is naturally a gradual change in the crops as we proceed north west.

It is to be specially noted that the number of district officers engaged is, in many parts, totally inadequate. Great areas, equal to the whole of Egypt, are only too often in the charge of a single superior officer, and I think that, until more workers are engaged, it would be of advantage tacitly to accept the position and confine the attention of district officers to *small sections*, in place of dissipating their energies over totally unmanageable stretches of country. This problem was one which presented itself to the Madras Agricultural Department recently. It was noted that, wherever any considerable success had been achieved it was where the district officer had confined his attention to a special problem in a limited area, leaving the rest of his charge comparatively neglected. There were two circles, one with 28,000 and one with 32,000 square miles of crops (the total in Egypt being 12,000). There are now seven circles, and this is regarded as only a preliminary step to be consolidated before further advances are made. In almost every part of the country, this inadequacy is being gradually brought home, and I would mention especially Bengal, Bihar and Orissa, the United Provinces, the Punjab and Burma as places where the shortage is most evident.

Although the addition of scientific specialists is urgently needed in many places, the Provinces are, relatively, better equipped in this respect. It is needless to emphasise the fact that their work is large interdependent with that of the district officers, and with a continued shortage of these, they lack the preliminary enquiry into the conditions to be improved, and the means by which they can bring their work to the attention of the mass of the cultivators. In one line, however, I can confidently recommend a strengthening, namely, in that of plant breeding. This can be started at once, and one of the most useful weapons of district officers in bringing home the usefulness of the Agricultural Departments is the provision of better kinds of the crops grown.

VI.—Agricultural Colleges.

When Lord Curzon founded the Imperial Agricultural Department in India, a large sum of money was ear-marked for its development, and the different Provinces were requested to frame schemes for approval, on which would depend their respective allotments. This was somewhat rapidly pushed through, and Colleges for teaching and research were founded at Pusa, and in Madras, Bombay, the Central Provinces, Bihar, the United Provinces, and the Punjab, while Bengal was contented with a research laboratory at Dacca.

At first a good deal of teaching was attempted at Pusa, but this was gradually diminished as the different local Colleges rose, until, at present, it merely consists, I believe, of certain post-graduate courses. The Provincial Colleges have not been uniformly successful. Those situated in the same general tract as Pusa, namely the Colleges at Sabour in Bihar, Cawnpore in the United Provinces and Lyallpur in the Punjab, have led a chequered career. I have formed the opinion that this has been partly due to the dominating influence of Pusa, with its large staff of specialists. Pusa has practically smothered the local Colleges in its tract, at any rate as far as research is concerned. The fault lies, in my opinion, in the way the department was started, sufficient information not being available as to the local needs, and, naturally, as large a scheme being prepared as possible, for otherwise they would have received a smaller share of the money available. A reconstitution appears to be necessary in North India, and I should advocate the concentration of the work into two chief Colleges, one for research and one for teaching, presumably at Pusa and Cawnpore respectively. Minor schools would then be necessary for each Province for local training, but what would be required in these would be chiefly vernacular courses for subordinate officers and cultivators. Bengal is difficult to discuss. There is no teaching attempted there and that given at Cawnpore would be largely inapplicable.

The Central Provinces, Bombay and Madras have all made great progress since the foundation of the Agricultural Department in India, and their Colleges have commenced very successful careers. This I put down to the following causes. In each case the Government has taken great interest in the College. They were too far away, and the conditions were too diverse from those at Pusa, for it to have any deadening influence. There was, in each case, a previous department which had been at work for many years on a smaller scale, and thus the new development had the advantage of a considerable mass of experience to draw on, so that it was possible for the forward movement to be made on sound lines. In comparing North India and the Peninsula, it is probable that there are many other factors which might be considered, such for instance, as the class of cultivators and their accessibility to new influences, but these need not be dealt with here.

Note on the possibility of India's producing its own sugar or becoming an exporting country.

(i) *The present high price of sugar and the question of its permanence.*

There is a marked shortage in the supply of sugar all the world over. This appears to me to be due to two main causes. In the first place, there is a rapidly increasing consumption *per capita* in all countries, and secondly, the huge supplies of beet sugar, hitherto exported from Germany, Austria and France, have been entirely cut off by the war. The world's pre-war consumption was about 18,000,000 tons yearly and beet and sugarcane were credited with about 9,000,000 tons each. The price of sugar is at present extremely high, and I regard it as probable that, the longer the war lasts, the higher it will rise.*

India has, as is well known, imported increasing quantities of sugar during recent years, the annual total reaching not far short of a million tons. This imported sugar used to come largely from Austria, more recently Mauritius entered the market, but at present it comes almost exclusively from Java. The world's shortage has made itself felt in India in that the retail price has nearly doubled. Can India, taking advantage of this, produce this sugar herself? Can she indeed look forward in the future to becoming an exporting country, as she once was?

There are two basal factors to be considered before approaching this question. We do not know whether this rise in price will be more or less permanent or whether, after the war, it will sink again to its former low level, and it is not an easy matter to start a sugar factory, as several years must elapse before the solid foundations of such an enterprise can be laid. Sugar-making in India must be considered, to a large extent, as a new industrial enterprise, and the difficulties in the way are much greater here than in any tropical country where the cane is grown. A vital question is the price of sugar after the war. I have formed the opinion that it will take many years before it sinks to pre-war level, if it ever does. And I base this opinion on the following facts and considerations—

(1) There is a constantly increasing consumption of sugar in all countries, and one effect of the war will be, I think, to give an impetus to this. I regard this increase as a permanent feature for many years to come.

(2) It seems probable that the British Government will take some steps to prevent the free dumping of sugar on the market by countries at present at war with us, and this will inevitably lead to an enhancement of the price.

(3) There is a considerable dislocation in the beet-growing area in Europe because the war has selected for its activities the particular area where beet is grown, and there has been a great and calculated destruction of property there. There will thus be less total sugar available. There is considerable shortage, even in Germany in spite of the cutting off of the whole of her export trade, and one of the lessons of the war will, I believe, be that it will be considered economical for much more sugar to be retained for internal consumption, both by man and beast, than was formerly done, in all beet-growing countries.

(4) With one exception of importance, to be noted below, I do not apprehend any immediate great extension of sugarcane tracts in the tropics. The following is, according to my idea, the position of affairs. There are a very great number of countries in which the sugarcane is grown, and great strides have been made, both in field and factory, during the last twenty years of agricultural revival. It does not seem likely that further improvements or extensions will be more than sufficient to keep pace with the normal, increasing demand, with one possible exception. For the sake of brevity, I will merely consider Java and Cuba, easily the greatest producers at the present time. There are many reasons for thinking that Java has nearly reached the limits of its production, as the past few years, in spite of strenuous scientific control, have shown decreased outturn on the estates, and it is generally conceded that practically all the good sugarcane land has already been taken up. With Cuba it is different. It is a great unknown factor. But there are interesting figures available which show that this country is worthy of special attention. It is, indeed, quite within the bounds of possibility that, in the near future, it may dominate the sugar position much as Brazil has done that of coffee. It has not, moreover, as yet been possible or necessary to bring to bear on it the laborious scientific work, which has characterised the industry in Java, Mauritius, the West Indies, Louisiana, Hawaii and other places. It will be seen from the following figures, that there is a great future in store for the Cuban Sugarcane crop—

Cuba's Sugar Production.

Before the war of 1898, it had reached 1,000,000 tons a year.

	TONS.
1897-1900	200,000 to 300,000.
1901-1903	600,000 to 1,000,000.
1904-1912	1,000,000 to 2,000,000.
1913-1916	2,000,000 to 3,000,000.

It is considered by some that the output this year may reach 3,500,000 tons. There are, I believe, great areas of rich land at present unworked, and capital and machinery are pouring into the country. There is little doubt that an important factor is thus introduced, which may have great influence on the future price of sugar.

(ii) *The difficulties in India*

(1) *The class of canes grown in India.*

Roughly speaking, there are two great sugarcane tracts in India, which differ fundamentally. The first is that in which thick tropical canes can be grown to maturity, often as well as in Java or the West Indies, the second is entirely given up to thin, hardy, fibrous, indigenous varieties, generally unsuited for the economic production of sugar.

The first region consists of the Peninsula (Madras, Mysore, the lower parts of Bombay and the Central Provinces) and, curiously enough, Assam. This is the natural sugarcane tract and is, in the main, in the tropics. The inclusion of Assam is due to its moist, equable climate, in which it resembles, perhaps more than any other part of India, the cane conditions of such a tropical Island as Antigua.

The second region is extra-tropical. Bengal and Bihar may be regarded as transitional, but, after passing the Rajmahal range of Hills, a great change is noticeable in the character of the flora and the crops grown. We soon enter the wheat region, as contrasted with that of sugarcane. This region includes the alluvial plains of the Ganges and Indus and extends into the north of the Central Provinces and probably of Bombay.

Now it is a curious fact, and a constant source of mystification to those not conversant with Indian conditions, that the acreage under cane in the sugarcane tract is comparatively insignificant, and at least 90 per cent of it is to be found in what I have summarily termed the wheat tract. This is one fundamental difficulty in any extension of sugar making in India. I am not prepared to discuss its causes in detail here, but would merely suggest that, in the past, with comparative lack of communications, and the presence of hardy indigenous kinds, the need of sugar or its equivalent gur caused the sugarcane to become an integral part of the cultivation in North India, whereas the smaller populations of the South were more accessible from outside and had other sources of supply in their palm forests. Furthermore, irrigation was necessary there, and the expense, generally of cultivating the thick tropical canes, was out of all proportion greater than that of the northern kinds, and this undoubtedly checked expansion in the south.

(2) *Competition with gur.*

Besides the unsuitable character of the canes grown, a second difficulty in the way of extension in the way of sugar-making in India is the fact that beyond the importation referred to above, sugar is not an essential food of the people. They prefer jaggery or gur, an extremely impure form of sugar, which cannot, as a rule, be economically used as a raw material for sugar-making. The great mass of the sugarcane grown in the country is used in the preparation of this commodity. The price is *comparatively* unaffected by the fluctuations in the world's sugar market and the chief factors influencing the extension of cane cultivation are the general increase in population and the rise in the scale of living, the character of the season and the prices of such other staples as are grown interchangeably with it. The relative profitableness of the conversion of the cane juice into gur and sugar has therefore to be considered in each tract before any decision can be reached as to the possibility of founding a sugar factory there. I am not in a position to discuss this question in its commercial aspects, but would merely draw attention to the fact that the contest between the two products is very unequal. Gur making can be conducted by anyone who has the canes growing, accurate tests regarding ripeness are unnecessary, no capital is required and the practice can be discontinued without loss. Sugar-making is a new enterprise in India, requires large capital and the difficult combination of many growers, can only be instituted after considerable preparation and cannot be discontinued without serious financial loss.

(3) *Subdivision of the land.*

These difficulties are emphasised by the opinion, general in sugar-making countries, that for commercial success, the enterprise should be carried on on as large a scale as possible. A large block of land is needed, so compact as to reduce the heavy carting charges to a minimum and the factory should have control over the fields so that it is kept constantly and evenly supplied with the canes. In the settled parts of the country, the holdings are small, and such sugarcane as is grown is in scattered plots of small size. It is impossible to alienate the land for an enterprise of this kind, and it is difficult for any control to be exercised by the factory. This is a very important difficulty and practically rules out large areas in the sugarcane tract from the possibility of sugar-making.

(4) *Competition with other crops.*

The whole question of obtaining land for growing sugarcane will ultimately depend on the relative profitableness of the crops now being grown. This will be referred to later, but it should be stated here that this rivalry varies with the tract, paddy being a serious rival in the irrigated parts of the Peninsula and in parts of Bengal, jute being the main rival in the sugarcane land of Bengal and cotton in the Canal tracts of the Punjab. These crops are not likely to be displaced and the extension of sugarcane in such areas is therefore unlikely.

Summarising, the extension of sugar-making in India is handicapped by the extremely poor character of the canes grown, by the unequal competition of gur where it has a steady and satisfactory market, by the relative cost of initiating gur and sugar-making, by the extreme sub division of the land which renders it impossible to work a factory economically, and by the competition of crops already on the land and which can be easily and profitably grown. We must turn to places where the price of gur is low, where the land is not fully settled and where it is possible to introduce a better class of cane varieties.

(iii) *Prospects in the different Provinces.*

I propose now briefly to pass under review the various tracts in India where sugarcane is grown, in order to emphasise the fact that each has its own peculiar difficulties and incidentally, to see in which directions progress is more likely to be effected.

Madras can grow sugarcane as well as any average place in the tropics. The crop however, requires irrigation, and thus comes into competition with other irrigated crops, mainly paddy. The latter crop is perhaps the easiest to grow in India, while sugarcane is one of the most laborious and difficult. With present prices of paddy and the possibility of growing more than one crop in the year, it is not likely that sugarcane will to any large extent replace it, even under favourable conditions. Where, however, large quantities of subterranean water are available, paddy competition is ruled out and the matter is less complicated, in that garden crops (those irrigated from wells) also require a good deal of labour. Ragi, groundnut, cholam may be regarded as typical of these. These are the new competitors, and the sugarcane has a better chance, especially as the individual fields are larger. As an example of successful work in sugar-making in such a tract, I would refer to the sugar factory at Nellikuppam in South Arcot. Here, with a better class of cane introduced by the work of the Samalkota Government Farm, with large stores of subterranean water and an easily workable soil, sugarcane cultivation has made great strides. By suitable advances, the distribution of manure and the abundant supply of water by powerful engines, it has been found possible to induce the ryots to grow large fields of sugarcane and bring the canes to the factory. But such areas are rare indeed in Madras, and it has always seemed to me as if a bit of the alluvial plain of the Ganges had been inserted in this tract between the hard red and stiff clay soils of the Peninsula. The tract is, in fact, composed of the alluvium of two rivers, the Gadilam and Ponniar, and is the centre of the ground-nut cultivation in India. From what I know of the conditions prevailing in other parts of the Madras Presidency, I do not consider it likely that any great extension of the sugarcane cultivation will take place, and the foundation of many sugar factories appears to be less likely still. I have dealt with Madras rather fully because it can grow such good thick canes, and this fact is constantly laid hold of by those who wish to extend sugar-making in India.

Mysore.—I am not very conversant with the conditions in Mysore, but a good deal of sugarcane is grown there. It is not a paddy country and the population is comparatively sparse. The rainfall is not great and irrigation is necessary. With the extension of irrigation projects or the discovery of subterranean water supplies it is not inconceivable that sugar factories may be started, but I would defer to the opinion of the Director of Industries, who has, I believe, made a special study of the question.

Bombay.—Here the problem is again entirely different. The competition of paddy is removed. Excellent cane crops are raised on the rich volcanic soils, and the juice is very rich in sucrose. Yet the area under sugarcane is insignificant. New irrigation projects are nearing completion in unoccupied tracts and it is expected that a large part of these will be planted with sugarcane. Whether this is utilised for gur or sugar-making will presumably depend on the prices ruling, but it should not be difficult to obtain large compact blocks if the latter is decided on and the capital is available.

The Central Provinces.—These are on the line of demarcation between the two great sugarcane tracts in India, and excellent crops of thick canes can be grown in the southern part of the area. The population is sparse and there is a considerable development taking place in opening up new irrigation works, by which considerable areas will be available for sugarcane growing. There is indeed reasonable hope that a great deal more sugarcane will be grown in the near future. But the amount grown is at present extremely small, the price of gur is very high and the local Agricultural Department do not consider that sugar manufacture can be undertaken on the new land in competition with gur.

Bengal is a great paddy-growing country, but this is chiefly in low-lying land unsuited for sugarcane. The higher land, with sufficient water to do without irrigation, is, however, fully occupied by jute, which has nothing to fear from competition with sugarcane. Good thick canes can be grown in many parts but, in spite of this, the varieties are, on the whole, exceedingly poor and primitive. There is undoubtedly room for considerable improvement here, but the Agricultural Department is under special difficulties in Bengal. The population is very dense and I do not think it likely that large blocks will be available for sugarcane growing, even with improved varieties.

Assam.—The unique geographical conditions of Assam have already been referred to. The population is very sparse and there are large unoccupied areas in Lower Assam on both sides of the Brahmaputra. The unhealthiness of the country has, I believe, improved of late years, and there is some likelihood of the increasing masses of Bengal pushing their way into the Assam valley. An experiment on a large scale has been made by Government, to see if these great unoccupied areas can be utilised for the growing of sugarcane. The first stage in this experiment has now been reached, and it is evident that with certain precautions, thick canes can be grown with great ease over large areas of the grass land in Kamrup. There are special difficulties in the way, such as control of surface water, absence of communications and scarcity of labour, which has to be introduced, but these are to all appearance being successfully overcome and the prospect is distinctly encouraging. There is a very large amount of land of a nature similar to that on which the farm is placed. The local price of gur, is, I believe, high, but the demand is not excessive, and it seems more probable that the limiting factor will be the prices ruling in the great Bengal market.

Bihar.—The canes in North Bihar are the thin indigenous ones common in North India, although there are some indications that selected thick canes may be grown with advantage. Bihar is, in fact, to some extent a transitional region between the great sugarcane tract in North India and the more tropical area of Bengal and Assam. There are a number of sugarcane factories working, and these I believe are, in the main, successful. I am led to think that this success is largely due to the fact that the country is one in which the European planter has worked for many years. He has capital, a crop is needed to replace indigo, the people have long been accustomed to work with him and grow the crops for his factories; he has a certain amount of control over the crops grown and, not infrequently, a certain amount of land is attached to the factory to form a basis for cultivation. The price of gur, although rather high at present is, I believe, as low as anywhere in India, so that, from the contiguous part of the United Provinces, it is sent as far as the Central Provinces and the Punjab. The pressing need in Bihar is, to my mind, the suitable location of a first class sugar station, where varietal and other experiments can be instituted with a suitable staff for combined work with the planters. I am told that the local agricultural practices leave much to be desired, and the canes certainly need replacing by better varieties.

United Provinces and Punjab.—The special conditions in Bihar and Assam are absent further north-west, and the prospects become increasingly less satisfactory. The canes grown are excessively thin and fibrous, the yield per acre is small and the percentage of sucrose in the juice is often low. This would, furthermore, greatly increase the area required for an up-to-date factory, with an increase in the cost of cartage. The fields are small and scattered and the cultivators are unaccustomed to sell their crops to a central factory. I do not think that there is much prospect of instituting sugar factories in this region, under present conditions.

Burma—This Province has been visited by the Sugarcane Expert for the first time since the above report was written. I find that there are large areas in Upper, Middle and Lower Burma where thick canes can be quite easily grown. I have only met with one indigenous Indian cane and consider it an introduction, from its botanical character, either from Natal or Bihar. There is any amount of uncultivated land available for the growth of sugarcane, so much so, that there is no part of India which can for a moment compare with Burma as a possible place for installation of sugar-making factories. Communications are over large areas quite good, much better in fact than I had been led to expect. The population is, however, extremely sparse and labour will have to be introduced. The canes grown, although thick are generally inferior and I am at once sending over half a dozen good varieties for their replacement. The local Agricultural Department is wholly insufficient as to numbers and fully employed on useful work and any steps taken will have to be supported by the Government of India. I would suggest the starting of a small sugarcane station in each of the five tracts which I have studied for the acclimatisation of better kinds and a study of the best methods of growing the canes. Everything connected with the sugarcane in Burma is on an extremely primitive plane, but in almost every place I visited its cultivation is being extended.

(iv) *Work in progress.*

A great deal of work is being carried out on this crop by different Agricultural Departments, but this is scattered and deals with purely local problems. Two experts have been entertained by the Government of India, both of whom are located in Provinces and under the local authorities. A Sugar Engineer is engaged in the United Provinces and a Sugarcane Expert in Madras. With the work of the former I am not acquainted and I propose here only to deal with the latter, in that I consider that the fundamental problem before India is the improvement of the class of canes grown. This is the problem for the solution of which the Cane-breeding Station has been started at Coimbatore. The main line of work is to replace the local North Indian canes by seedling canes, and this, unfortunately, cannot be done in North India because the sugarcane does not flower there. Attempts are being made to obtain new varieties by crossing thin indigenous canes with thick tropical ones, thus combining useful characters of the two classes. Hardy, moderately thin, rich canes are aimed at, which will grow in North India to maturity and be able to withstand the local indifferent treatment at the hands of the ryot. That such an ideal is not unattainable is shown, in the first place, in that crosses have been obtained, although not at present in sufficient quantity or sufficiently studied for distribution and, secondly, because a trial of such a cross has been rendered possible by work in Java. A seedling cane raised there was obtained in Madras and forwarded for trial by the Sugarcane Expert to Shahjahanpur. It was obtained in Java by crossing the local "Chunnee" of Shahjahanpur with the rich "Cheribon" of Java. It has been tested now for some years at the Shahjahanpur Farm by Mr. Clarke, and the accounts received have been very favourable as to its growth, in that last year all the available setts (some 9 lakhs in number) were eagerly taken up by the cultivators. Another variety was introduced by the advice of the sugarcane expert into the Partabgarh Farm, and it has rapidly extended until, in the present year, some hundred acres are under it near that place. These two cases are given as a sample of the work which it is intended to carry out when the new varieties, being evolved at Coimbatore, are ready for distribution. Altogether some 120,000 cane seedlings have been raised at the cane-breeding station, and it is confidently anticipated that, from among these, and those still being obtained, it will be possible to allocate suitable seedlings for every part of India. It has been estimated that the results of the introduction of new and better canes into Madras some years ago by the Samalkota Sugar-station have culminated in a gain of Rs. 25 per acre, totalling 25 lakhs a year. If the improvement in North India reaches the modest sum of Rs. 5 per acre, it will mean ten crores a year in the ryots' pockets.

It is perhaps needless to point out that, if such an improvement can be brought about, the question of sugar-making in India will enter on an entirely new phase. The price of gur would be regulated all over the country and probably considerably reduced by the greater yields obtainable, and there would be a surplus available, with more suitable cane varieties, for the flotation of sugar-making concerns. But the whole question has its complications, and I do not think that useful results can be obtained with certainty, unless a large view is maintained and the work is properly organised.

(v) *Founding of a Sugar Department for India.*

For this purpose I would suggest the formation of a small Sugar department for India to be placed directly under the Agricultural Adviser to the Government of India. I would indicate some of its objects in the following manner, but it is inevitable that the relative importance of the different lines of work would only be clearly understood as progress could be reported:—

(1) The collection into one office of the scattered information recorded regarding the character of the sugarcane tracts in India, the varieties grown, the methods of cultivation and of making the finished product.

(2) The collection of similar information regarding all previous attempts at founding sugar factories, with the reasons for their discontinuation.

Much of this information (under 1 and 2) is now to be found in the files of various Secretariat and other offices in the Provinces, but it is not available, and it is desirable to get it together, collate it and, doubtless in some cases to publish it in book form or otherwise, to serve as a basis for future work.

(3) A continuation of the work on improving the class of canes growing in different parts of the country.

(4) An organised investigation into the local practices of gur-making throughout the country, with the object of introducing improvements according to the local conditions.

(5) A special study of the possibility of starting a sugar-making industry in the various tracts where sugarcane is grown.

For such a department to be effective I would suggest the attachment of the following experts:—

(1) A factory expert. He should be thoroughly acquainted with the conditions in India as regards factory work, labour difficulties, general cultivation and the use of by-products. It would be an advantage if he had a working knowledge of the factories and plantations in Java, where the conditions are somewhat similar to those in India.

(2) An Engineer for the study of existing installations and the preparation of new models and combinations for gur and sugar-making.

(3) A chemist for the study of the cane juice and fibre, to conduct ripening tests and manurial experiments, and to assist in the factory work.

(4) An Agriculturist, whose main duty would be to study the local conditions of soil and climate as affecting the need of irrigation and drainage, the proper times for planting and reaping and the relative periods of growth in different tracts.

(5) A Botanist, for the study of the numerous varieties existing, the transference of varieties from place to place and the raising of new seedling canes for each tract.

Such a department would, at the outset, be largely engaged in collecting material already existing in the country, so as to gain experience as to the proper lines for work. It should therefore be in close touch, consultatively, with the Provincial Departments of Agriculture interested in the crop, and should be prepared to assist and further any work now being carried on by advice or in any other way. Where local effort is considered insufficient, it should inaugurate plantations or experiments on its own initiative, but I would specially desire that local efforts should be encouraged, because the officers on the spot will of necessity have the most reliable first hand information as to the conditions and possibilities of their tract. The work at present being conducted on sugar and the sugarcane is scattered and, for the best results to be obtained, I feel sure that it needs to be organised under one head.

Note on other questions connected with the organisation of technical and scientific departments.

The development of Technological institutions.

From what I have said regarding the Agricultural Department in India it will not be surprising that I am of the opinion that the foundation and development of industrial and technical research departments, allowing for variations in character in special cases, should, on general principles, be gradual at first, according to special individual needs, and not, from the start, fitted into a general scheme. If a large sum of money is voted for the establishment of a new department and it is started *de novo*, there is little doubt in my mind that there will be a good deal of waste of time and money before it settles down into profitable and safe lines. Instances can easily be selected in the history of the Agricultural Department given above, and other cases will doubtless occur to the Members of the Commission. This fault is the natural result of a lack of careful detailed groundwork beforehand and accurate knowledge of the conditions which it is desired to improve. If, for instance, more time had been available for the foundation of the Central Agricultural Research Institute for India, I do not think that it would have been located at Pusa, and I consider that the money spent in the building of some of the Provincial Agricultural Colleges might have been more economically spent in an increase in the work carried on by district officers.

There are thus two entirely different methods of founding Research Institutes:

(i) Commencing in a small way, with a few experts, dealing with a few carefully selected subjects. If progress is made it will be along safe lines, and, once it has begun, advances will be cumulative, and it will soon be necessary for a larger scheme to be initiated. There is every likelihood then that such schemes will develop along sound lines. But there is, at present, a great difficulty here, of which I am fully aware. Much will depend on continuity of policy under different individual members of Government responsible for the department, and it will often be difficult to allocate funds just when they are needed for expansion. When the Agricultural Department in India was started some ten years ago I pointed out the danger of this building from above downwards, but was at once told that if we did not prepare big schemes we should not get the money. There were at that time ample funds for disposal and the Government of India was prepared to earmark a considerable annual subsidy for each Province, provided that a suitable scheme was presented, and if we did not each of us rise to the occasion with a big scheme I was told that we should be permanently crippled.

(ii) For a large scheme to be sketched out, the details of which would be filled in later. The advantages and disadvantages of this have already been given. Money would thus be secured, but it would be more or less a matter of chance as to whether this could be profitably employed in the absence of experience, only to be gained by the successes or failures of a smaller affair.

There is no doubt that there is abundant room for an enormous expansion of scientific work in India and that this will add greatly to the resources of the country, but, for the best results, I believe that new enterprises should be started on a small scale and the greater development should, in almost all cases, only be attempted after the section has justified its existence by sound spade work. This will obviously depend, in the first instance, on a settled policy on the part of Government for the allocation of funds whenever they are needed for expansion, and this is perhaps the main factor in the situation. Money is not always available, and, this being so, a reserve fund should be started and held inviolate for future needs.

The linking up of the different sections of industrial research will, as a natural corollary, come at a later time, and I am not in favour generally of the foundation of large central institutes, at the outset. The conditions in different parts of India vary so widely that it is often essential to study them on the spot, and any number of visits from such a centralised institute will not equal the intimate local knowledge which is often necessary before progress can be made. I may perhaps be excused for again drawing an example from the local Madras Department of Agriculture. After some eight years' work in a small way, the results obtained were analysed by Government and it was decided that it was time for a step onwards. Drawing on our experience, we pointed out that there was greater need of increased district work than in the increase in specialists, and a new scheme was evolved by which Government allocated between two and three lakhs a year for new salaries alone for this section of the work. It is not likely that a further step will be taken for a number of years, in fact, until the results of this expansion are fully studied. It is to my mind not improbable that the next move may be for more experts to deal with the problems which will be presented by this further minute study of the country's conditions, but we have at present settled down to fill in the details of the new expansion and give it a fair trial.

Co-ordination of research.

The question on the co-ordination of research so as to prevent possible overlapping may be discussed here. This, is seems to me, will vary according to the nature of the subject and the stage of development.

The only body that I know of which is concerned with this aspect of scientific work is the Board of Scientific Advice. Its members are, naturally, the executive heads of the various Government departments engaged in any scientific work in India. I doubt very much whether it has had any influence in the matter. As far as I can see it is, at present, mainly concerned with the collection into one volume of the summarised results of each year's scientific work in the different Government departments. This is a useful publication and perhaps it is as well that the energies of the Board are confined to its production, for I do not see in what way it can be of any other service.

In a well organised and numerous department dealing with the whole of India, such as the Forest Department, it is possible that unnecessary duplication of work might occur, but there is surely an efficient machinery for the allocation of definite pieces of work to specially selected officers and preventing any unnecessary overlapping. The Agricultural Department consists of separate units and there is no such machinery. But, with the comparatively small number of officers engaged and the vast field for their work, the question does not acquire the same importance. It has, however, arisen, and was discussed by the Board of Agriculture when meeting at Coimbatore. It was the almost unanimous opinion of the Board that no attempt should be made at preventing any such possible overlapping and, indeed, that, considering the diverse conditions of the different provinces of the country, it would be a positive advantage for officers to attack similar problems, as any disadvantages would be more than counterbalanced by obtaining results bearing on the same subject under different conditions.

I consider it undesirable to apply any general rule, but that each subject should be considered on its merits. Generally speaking, overlapping as it is called, should be encouraged. My own experience, as an officer engaged in studying a single subject in all parts of India, is that every bit of work done on my subject by independent Provincial officers is of value to me, and I would gladly see a great increase in the number of workers, even although I have not the least control over the character of the work done. One of my greatest difficulties is the lack of direct first hand knowledge of the crops and their characters in the different Provinces, and I gladly welcome any piece of work produced on my subject.

Even if a special problem is attacked by two independent officers in different institutes, I regard it as probable that the value of the results obtained will be greatly increased by the confirmation or criticism thus obtained, and I am strongly of opinion that, in the vast majority of cases, no restraint should be put upon any worker desirous of attacking any problem of importance. But, as I have said before, cases must be judged on their merits, and no general rules should be attempted.

Study of foreign methods.

I regard it as of increasing importance that facilities should be extended for officers engaged in scientific work in this country to study methods practised elsewhere. It is inevitable that the experience gained after a few years' residence in India will alter their outlook as regards the conditions, and the character of the problems to be attacked. In many cases, also, new lines of work are suggested by Government, of which the officer has no experience. This has been recognised by Government and detailed rules have been laid down on the subject. I do not consider that these rules will tend to encourage men to take study leave, in that they are penalised financially. It is perhaps more important that such visits to foreign countries should be made early in their service, say after three or four years' work, and the principle of only allowing half-pay with a subsistence allowance which will barely cover his out-of-pocket expenses and in certain cases will certainly not do so, will usually make it impossible, for financial reasons, for an officer to avail himself of the privilege. It must be remembered that in the early years of his service he is at the bottom of his scale of pay, and half-pay under these conditions is such a handicap that all leave is carefully avoided. While on duty, I maintain that an officer should have higher pay than when on furlough and, if this duty entails heavy extra expenses, as will be the case if he visits other countries than England, that a suitable allowance should be granted according to the cost of living in the country visited. In making these recommendations, I would emphasise the point of view, not that the granting of study leave is a privilege to the officer concerned, but a permanent gain to Government in the character of his work, and that, such being the case, such terms should be granted as to encourage officers to avail themselves of it. The existing rules are extremely exacting and it seems probable that an officer with leave due to him will choose to use such leave and proceed with his study, in preference to submitting himself to be tied down as he would be under the existing rules.

Reference Libraries.

The founding of reference libraries is a matter of very serious importance to technical departments in India. I have no experience excepting that gained from the library of the Agricultural Department in Madras, of which I had charge at one time. A great number of books have been added during recent years but, in many subjects, there are very considerable gaps, I would point out that the founding of a library does not only depend on the readiness of Government to buy books. Much will depend on the voluntary work of officers in special sections, and it often happens that such have their private libraries, and have little direct concern in fitting out that of the department. While the scale of periodicals received is on a generous scale, the addition of up-to-date volumes on special subjects leaves much to be desired.

But there is a more important aspect of the question, which is usually lost sight of. The immediate control of library has been voluntarily taken by one of the experts, who is very fully employed in his own section. Under him it is in charge of an ordinary clerk. The result of this is that progress in arranging and adding to the half-formed library is slow and spasmodic. New books are sometimes urgently needed, and the plan usually adopted in such cases is for the officer desiring them to prefer to purchase them himself to submitting to the inevitable delays in obtaining sanction and purchasing them in the usual official way. I think that this state of things could be largely remedied by placing a fully qualified scientific assistant in the library, the attachment of a clerk with unscientific knowledge having proved itself unsatisfactory in many respects. The work in a technical library of any size cannot be properly undertaken by an ordinary clerk. A scientific head should be able to prepare analyses of the contents of periodicals, subject and pamphlet catalogues and so forth, all of which are essential, if the various experts are to make full use of the library, without the expenditure of much time and labour in hunting up references.

The Indian Science Congress.

My knowledge of this is not extensive, but I have followed its course with interest and have from the first done all in my power to make it a success. I regarded it from two main points of view. In the first place, with the increasing departmental publications, there was little done to interest the general public in science, and, in the second, the great predominance of scientific work in these publications was written by Europeans; they do not appear to offer any easy medium for work by Indians.

(1) The main function of the Indian Science Congress is, in my opinion, that of interesting public opinion in the importance of scientific work. In this respect I would compare it with the British Association, at any rate in the period during which I used to attend its meetings (some twenty-five years ago). It is a purely unofficial body and its work is entirely voluntary. The British Association has no executive powers, depending solely for its influence on generally impressing the public. I would therefore entrust the Indian Science Congress with no powers and keep it rigidly unofficial. There is no doubt that it has been thus far greatly helped by official recognition, but I look forward to the time when this will no longer be necessary.

(2) The second point is an exceedingly interesting one, in that it brings up the question as to whether the native of this country is adapted for research. Hitherto it has been found necessary to engage Europeans for most of the appointments which carry with them the need for research, and by far the bulk of the work is done by them. It has been held by some that, under this regime, there is little chance of the Indian developing a scientific bent and, if he does, that he stands little chance of getting into print. I looked forward to the Indian Science Congress, being purely voluntary and unofficial, as a means by which this question as to the adaptability of the Indian mind for research could be solved, and incidentally, that it would afford the means whereby the Indian worker would be encouraged to make the first flights, which are always the most difficult. On looking over the lists of papers, without in any way judging of their relative value, I think that the Congress has more than justified its existence from this point of view alone. The papers are almost equally divided between Indian and European workers, and the former should be encouraged to the utmost to improve the type of papers they have contributed. Of course, it must be remembered that the European experts employed by Government are largely ruled out, in that they are usually already too fully occupied to find time for writing papers for the Congress, and that most of their work finds its natural outlet in their departmental journals, but this is not altogether a bad thing, if it encourages independent work on the part of their assistants, and the result of the Congress's work in this respect will doubtless be of great ultimate assistance in the advancement of science in India.

Any identification with Government Departments is to be avoided and those subjects should in my opinion receive the greatest help where the Indian writers predominate. Thus they have made Ethnography peculiarly their own and have made a good show in Chemistry, Physics, Botany and Geology. There are very few Indian papers in Zoology and Agriculture has been practically left untouched by them, showing that this subject has had special departmental encouragement. I doubt as to the wisdom of including it in the papers read before the Congress.

I regard the Congress as mainly of use for the encouragement of those workers who have not their own means of publication, and this will include many professors in Colleges. Their work should be encouraged for, in the past, it has been all too common for them to be content with their professional duties, often heavy enough, and much useful work has been lost to the country.

I do not think that anything can be done to increase the usefulness of this Association, but I would gladly see a gradual discontinuance of official help in all directions, provided that the movement shows itself able to become established without this help. As industrial development proceeds, and new workers enter the field, doubtless the Congress will enlarge its borders, but there should be no discouragement of purely scientific papers.

NOTE.—*Dr. C. A. Barber did not give oral evidence.*

WITNESS No. 258.

RAO BAHADUR M. ARUMUGAM PILLAI, *Retired Deputy Collector and Agent, Sri Chithambara Vinayakar Mills (Limited), Koilpatti.*

WRITTEN EVIDENCE.

India is a country possessing great possibilities for the development of industries agricultural or otherwise. Its wealth should be measured by its capacity to produce raw materials. It has plenty of capital but it is scattered and shy. It merely requires to be concentrated and organised. Its people are possessed of natural intelligence not in any way inferior to other nations, but it remains dormant and requires to be stimulated and led into useful channels.

At present the country is industrially behind many countries by several decades, and unless it is proposed to make heroic efforts it will not be possible for it to overtake them. The Governments in India mean well and want to do much but are handicapped in the adoption of necessary policy on account of the importance of Imperial interests of the Home Government which are affected by international considerations. Hence all efforts made in India have necessarily to proceed on lines of least resistance. Then there is also the question of agricultural industry which must for ever remain predominant in India. Any other industry started or developed should be so regulated that it does not injuriously affect the agricultural industry lest it should give rise to many social problems which are now happily absent in India but are convulsing many European and other countries where agriculture plays a subordinate part to other industries.

Keeping the above facts in view, I beg to offer my opinion on the questions raised by the Commission.

Capital.

I wanted to raise capital for the improvement of the Spinning Mill at Koilpatti but could not succeed. Private capitalists hesitate on account of previous failure while the rules of the Madras (Presidency) Bank do not permit of lending or advancing money on the security of buildings and machinery of the mill.

For small industries, capital is ordinarily available from private money lenders and "funds" (credit societies worked on co-operative principles). I have experience as a director and shareholder in some of these "funds". For big industries, company formation under the Indian Companies Act where a few capitalists play an important part is the main source from which capital is drawn.

The capital so raised is generally sufficient only to meet the initial outlay on buildings and machinery and plant. For working expenses capital is raised by borrowings chiefly from the Presidency Bank on the security of joint and several promissory notes of two or more persons unconnected with each other in general partnership and to some extent from private money lenders. Deposits of surplus money are very seldom made in industrial businesses. Debentures of the Indian industrial concerns not recognised by Government are not popular. The result is that persons on whose security money is obtained from banks have to be shown special concessions and paid commissions in addition to interest payable to the Bank, etc., on borrowed capital at rates which are not fixed but which fluctuate from time to time according to the condition of the money market. These conditions imposed at the very outset seriously hamper the success of the industry. This is my experience.

Co-operative societies.

In the present state of this part of the country, co-operative societies are bound to remain mainly credit societies including as one amongst their objects, assistance to small industries. In this way cottage industries such as weaving, oil pressing, etc., peculiar to the localities in which the societies are situated are encouraged and have proved complete success.

Co-operative societies should be encouraged wherever there is scope for the development of cottage industries on a large scale, such as weaving in Conjeeveram, Mayavaram, Tinnevelly; oil pressing in Cuddalore; pottery in Panrutti and so on. The organisation of these societies should be decided on the peculiarities of the locality and its people. One thing required in common for all such societies is that Government should recognise them each in the manner it deserves.

Thus (1) to remove the difficulties in raising capital, (2) to relieve industries from the conditions by which they are hampered, and (3) to encourage the establishment of co-operative societies and assist them, the remedy appears to lie mainly in the establishment of a Government Central Industrial Bank for each province with branches at necessary centres. The Presidency Bank has enough to do and more, and the method in which it is financed renders it unsuitable for the encouragement of the establishment of industries and their development. The mode of financing the Industrial Bank must be such that, should the bank in carrying out the business entrusted to it which must be on lines different from those prescribed for the Presidency Banks,, by any chance incur loss it may only in the last resort fall on the general revenues.

I have had some experience as a Revenue Officer, of financial aid by Government in the construction of wells and purchase of cattle and seed by the ryots, and the supply of yarn to weavers during famine.

Government assistance.

I consider that of the several methods of Government aid enumerated under question 5, (*a*) the grant of loans and (*b*) the supply of machinery and plant on the hire-purchase system are the best and may be made a permanent feature of the Government's industrial policy. The other methods may be required from time to time in helping particular or individual concerns. Special Government control may not be welcome and may stultify the very object of the aid. Submission of periodical returns for information as is now enforced by banking agencies, and audit of accounts and inspection of the premises and machinery as in the case of non-aided companies and factories, followed by advice on technical and business matters appear to be sufficient as safeguards. If however the directors of any aided industry at any time find it necessary that the working of the concern must be taken up under direct Government management or brought under some sort of Government control, their application may be granted on such terms and conditions as may be found suitable to the exigencies of the case.

Even in respect of an enterprise not receiving any form of Government aid, the Government should exercise paternal care and keep themselves informed of its condition and progress through the Inspector of Factories or the District Magistrate who is now required to inspect it periodically, and should give the proprietors timely warning and advice telling them, if necessary, the assistance which the Government are prepared to give to it to set right matters.

Technical aid.

Q. 15-16.—I have personal knowledge of the benefits received by the spinning industry from the research conducted by the Government Agricultural Department in the matter of cotton.

Q. 17.—The loan of Government experts may be made to private firms and companies on the same terms as loan of Government officials is given to land-holders and Native States under the Foreign Service Rules (Civil Service Regulations).

Q. 18.—There should be no restriction on the publication of the results of researches made by a Government paid expert while attached to a private business if the publication will be for the good of the country. This must be made a condition precedent to the loan of a Government expert. If the private concern had incurred expenditure on this account it must be compulsorily purchased by Government.

Demonstration factories.

Q. 19-20.—Whenever there is an improvement made in connection with any form of industry which it is not possible to learn without demonstration, the duty of demonstration may be undertaken by Government.

Surveys for industrial purposes.

Q. 25-27.—India's natural resources are almost unlimited and any knowledge that may exist now will have to be supplemented by further surveys from time to time. Any technical survey should be preceded by the collection of information by Government officials of the Revenue, Forest and other departments who during their tours have discovered the existence of any source of raw products useful for industries.

Commercial museums.

Q. 28-33.—I have not had experience of commercial museums or purely industrial exhibitions, but I have heard it said that except in the matter of some of our cottage industries which cannot be supplanted by machinery worked by power, they expose our weakness and assist other enterprising people to capture our markets. Every Indian shop where the products of minor and unorganised industries are sold, is an exhibition in itself.

Trade representatives.

Q. 34.—I have heard it from my European friends that the absence of Indian trade representatives in Great Britain is a great disadvantage to the success of Indian trade.

Government patronage.

Q. 37-38.—It will be useful if Government departments which use imported articles publish list of these articles. The rules relating to the purchase of stores by Government departments have undergone many changes in recent years that it appears unnecessary to make further changes at present.

Land policy.

Q. 41-43.—I do not think that the land policy of Government has been found to have checked industrial development. The Land Acquisition Act, as it is, cannot help private companies to acquire lands for their purposes through Government agency unless their concerns are such as to allow the *public* to use their work like the Railway and Canal Companies. The Madras Estates Land Act seems almost to prevent any acquisition by companies of land for industrial purposes even by private arrangement in proprietary villages. The two Acts may be amended suitably. It will be a useful and valuable form of aid if Government can provide land for selected industrial concerns free of cost, or free of rent, or on favourable rent for a term of years on condition that the work shall be executed within a stated time and maintained in proper order.

The Court of Wards may be authorised to start industries whenever they have surpluses in any estate instead of handing them over in full to the ward on the rendition of his estate.

Training of labour.

Q. 44-45.—My experience of the measures adopted in the Ginning and Spinning Factory at Koilpatti leads me to suggest the following as steps calculated to improve the labourers' efficiency and skill:—

(1) Building of huts in close proximity to the factory for the accommodation of the labourers.

(2) Provision of light refreshment to half timers.

(3) Giving bonus on the excess work turned out over the minimum fixed.

(4) Grant of holidays at times in addition to those allowed by the statute.

(5) Making unskilled labourers to work jointly with skilled labourers.

(6) Promotion to higher pay of such that show efficiency and skill.

Notwithstanding all the above privileges and concessions in force, there is yet a tendency on the part of the labourers to scamp work. This is due to a want of sense of duty, caused by the want of any kind of moral training. We are trying to introduce steps for the imparting of this training and as a first step have started a school for our half timers where they are given elementary lessons in the three R's. I consider that the above measures are sufficient for general adoption. For the ginning and spinning industry in which I have had experience, the institution of Provident Funds will do good.

Apprenticeship system and industrial and other schools.

Q. 46-48.—My experience in training apprentices is limited to Koilpatti Factory and home industries. The training obtained is good enough for practical purposes, and can be rendered more efficient with some theoretical training added to it. Such theoretical training with practical courses is given in some of the industrial schools now established in several places in this Presidency. The best way to develop and co-ordinate the two systems is to compel or induce students trained in industrial schools, either aided or un-aided to attach themselves to some factory workshop, or approved workmen as apprentices. Even during the training period, the students may be taken on excursions to visit factories, etc., which can be arranged with the permission of the owners thereof.

Q. 49.—We are having a day school for short time employees of our factory who are worked on the three hours shift system. This school is situated close to the mill This has proved a very great success and has also added in a way to the efficiency of their work at the factory. I have no experience of night schools. But such schools cannot help all short time employees unless they live within easy reach of the school. The development of schools will depend upon the amounts which the factory owners are willing to spend and which the Government can afford to aid them with. The scope is unlimited.

Q. 50.—The industrial schools in this Presidency are under the control of the Director of Public Instruction who is the head of the Department of Education. This I think, is as it ought to be. Industrial education cannot be improved without the aid of general education. The Department of Industries need have no control over these schools financially but may be allowed to prescribe the curriculum of studies to be adopted in such schools and to inspect them and advise on matters professional.

Training of supervising and technical staff.

Q. 51.—For the training of supervising and technical staff such as supervisors and managers the Victoria Jubilee Technical Institute at Bombay may be taken as a model and an institution similar to it may be established at Madras. I believe there is already a proposal to this effect.

Q. 52.—When an expert of a private firm is selected by the Government to study conditions and methods of other countries he may be given the same privileges allowed to Government Scientific and Technical experts (see question 77).

Q. 53.—Whenever any Government assistance is given to private firms, it must always be made a condition precedent to the grant of such assistance, that technical experts deputed by Government should be trained in such factories. The circumstances and conditions must necessarily vary with the nature of the training to be given and the time necessary.

Mechanical engineers.

Q. 54-55.—In the Madras Presidency the provisions of the law requiring qualification for an engineer in charge of a prime mover are not yet brought into force. Uniformity in the standard of examinations for technical engineers held in the various provinces is desirable, and Government will do well to take measures in this direction. At present persons possessed of certificates granted by the Bombay Boiler [illegible] examination [illegible] are utilised by such Madras factories as desire to have [illegible] in their employ. The absence of a rule requiring qualification [illegible] for an engineer before he is put in charge of a prime mover [illegible] glaring to be criticised. I think [illegible] time that the [illegible] subject were put into force in the Madras [illegible]

Official organisation.

There is a Director of Industries besides a Director of Agriculture for Madras. Both these offices are occupied by officers of the Indian Civil Service. They may be termed non-expert officials. These two directors have for their assistants or subordinates trained experts. I doubt if any of the latter is a business-man. As directors have to take a long range view from the production of the raw material to the consumption of the finished product, they must be men possessed of great administrative talent. An expert or a business man is a specialist and moves within a certain groove and he develops great efficiency when he is supported by an experienced administrative head. The Director of Industries should travel and visit industrial centres not only in India but also in other continents. A Director assisted by experts and businessmen is all that seems required for the present. A Board of Industries or an Advisory Board for each province seems unnecessary. If the Directors of the different provinces meet in conference once a year or so, no separate form of machinery need be devised to correlate their separate activities.

Study of foreign methods.

Q. 77.—Government technical and scientific experts should be encouraged to study conditions and methods in other countries by the grant of study leave, honorariums, and, in cases where necessary, their travelling expenses.

Reference libraries

Q. 78.—It is very necessary that a library of technical and scientific works of reference should be established at some centre, and all industrial concerns invited to become members of it. Much difficulty is at present experienced for want of a consulting library.

Factory Inspectors employed at present not being experts are not in a position to give professional advice during their inspections. The work which is at present done by them may be efficiently performed by the District Magistrate, who is ex-officio Inspector, and his assistants. It is imperative that a Factory Inspector should be "expert" and be relieved of the drudgery of 3 or 4 inspections a year of each factory which under present regulations reduces him to the position of a fault finder. He must be able to do substantial good to the industries even though his visit may be limited to one in each year.

Commercial intelligence.

The propagation of up to date knowledge on commerce and industry remains a desideratum. Whatever information is available should be made known at once, if it is to be of use, both in English and Vernaculars by means of special monographs and leaflets widely circulated with Government Gazettes. Industrial concerns and newspapers may be advised to register their addresses and may be supplied with copies of the publications.

Railway freights.

Railway freights form an important factor in the making or unmaking of big industrial concerns. I had a grievance in respect of railway freight for coal and cotton which was however recently removed by the Railway Company at the instance of the Director of Industries. Railways, whether managed by the State or by companies, should regulate their freights on specific goods consigned to particular localities or even particular industrial concerns of sufficient magnitude and importance to deserve public or Government support, so that the success of the industry may be preserved from injury by foreign competition.

Jail competition.

I have no complaints to make regarding competition by jail industries.

General.

I have been actively concerned in ginning and spinning industries. So far as ginning is concerned I do not think that any special encouragement is required to develop it. As regards spinning, there are intricate problems to solve. As cotton is used for purposes other than the manufacture of cloth, its price does not at times co-ordinate with the price of yarn. Japan's competition is becoming more and more pronounced every day, and unless Government and its legislature render help it threatens to imperil Indian industry. The shipping freight for cotton from India to Japan went down to Rs. 17 per ton net in 1916 as the result of an agreement between the spinners and the ship-owners of Japan. This is the rate the South Indian Railway charge for a distance of about 225 miles even at the reduced concession rate.

The Indian Factories Act restrict the working of textile factories to 12 hours a day while in Japan, mills work both day and night and their working hours average over 20 hours a day. There the Government help spinners with subsidies and guarantee good dividends. These concessions enable Japanese merchants to raise the price of Indian cotton and to sell their cotton goods cheap to the detriment of the Indian spinners. On the other hand, from the point of view of the agricultural industry the Japanese competition has proved a real blessing to this country and has given stimulus to cotton cultivation. It will be suicidal to stop it in the present state of transition through which cotton cultivation is passing in this country. The position is thus perplexing, and the means by which the spinners' difficulty may possibly be minimised, if not altogether removed, is for the Indian Government to provide to Indian spinners and [illegible] measure of relief which the Japanese Government affords [illegible] and thus neutralise the effect of Japanese competition in cotton goods. [illegible] India [illegible] cotton [illegible], and hence the remedy above proposed will not interfere with the cultivation and improvement of cotton in this country and will at the same time help to develop the spinning and weaving industry to the desirable extent.

Q. 113.—I think if proper investigation is made it will be found that clay suitable to make what is known as "China clay" which is an imported article at present may be discovered. Having met with such a clay in Panruti, Cuddalore district, I mentioned the fact to the firm of Narayanaswami Nayudu & Sons at Nellikuppam who after experiment supplied me with a quantity of China clay manufactured by them. It was inferior to the imported clay but the firm informed me that they could improve it after they were able to get the required machinery.

NOTE.—*Witness did not give oral evidence.*

WITNESS NO. 259.

MR. A. R. RANGACHARI, *Honorary Secretary, Madura Dyers' Association, Madura.*

WRITTEN EVIDENCE.

That India is far behind other countries in the world in respect of industrial progress is a patent fact. That India offers a fertile field for foreign exploitation is an established truth too. India is in an unfortunate position in that her sons have no knowledge of converting her raw materials into finished products, with which nature has endowed her most bounteously, and that she has, therefore, to look to the foreign agencies to vend her raw products. One other feature, sadder than anything else, is that she receives finished products in exchange for her raw ones and that the value of the former far exceeds that of the latter. One cannot deny that this is a great drain upon her wealth. How long can a country submit itself to such a drain and how long can its wealth stand? Under the circumstances, it is a good augury that the Government has taken up the question and instituted this Commission to diagnose the causes that have led to the industrial degeneration of the country and to suggest remedies therefor.

To this industrial torpor, the people and the Government have alike contributed. The people have been selfish and contented themselves with very meagre earnings accruing from the conservative class of trades and professions. They have paid little attention to the development of industries and they have with avidity, taken the part of middlemen between the foreign supplier and the local consumer. The masses lack education and those that have received education have had little or no grounding in applied sciences. Men that have received higher education have taken to learned professions and until they found the avenues for those professions either over-crowded or closed to them, they had not remembered that "Labour is Honor". Then, again, people have no union amongst themselves and do not co-operate with each other. Individualism plays the largest part. Indian money is very shy. The investment of capital on machinery is very commonly considered as a waste. There is no mutual confidence between the capitalist and the trained worker. The capitalist poisons himself with the belief that money is omnipotent and the trained man languishes that money is not at his command. On the whole, all along the people have been contending themselves with what came into their hands, without giving serious thought to the uplift of the industrial condition of the country.

The Government on its part has been assiduous with the administration of the country and devoted little or no time to its industrial regeneration. It has not provided the people with schools for industrial training. It has not seen that free and compulsory primary education given to the masses and the establishment of institutions for imparting scientific education on practical lines are the prime factors in the welfare of a country socially, politically, industrially and commercially.

There has been no financial help of any magnitude to new or existing industries such as Germany and Japan rendered to their peoples. In attributing these causes I have not lost sight of the slow awakening that has come both to the people and the Government. But I believe that neither the people nor the Government had adequately grasped the situation until the war came and bestired them to more severe thinking. The war, in spite of its rude aspects, has had one benefit. The indolent have been made active and every country has been obliged to take a survey of its position. Countries such as America and Japan are benefitting fully by the war. The existence of some industries long before the war broke out, the availability of capital and expert knowledge and the financial and other helps of the Governments concerned have enabled the above countries to consolidate the existing industries and build up new ones under the favourable circumstances created by the war. Whereas, India has lagged behind and is still engaged in the survey. The slow awakening has to be quickened therefore and practical work commenced in the immediate future in as many directions as possible.

In the first place, confidence must be created between t [illegible] he Government. They must feel together and act together. Unfortunately there are some factors which have estranged the people from the Government and made the former to suspect the motive of the Government in relation to industries. The maintenance of an excise duty on Indian mill made cotton products and the recent enhancement of the same are directly opposed to the effort of the Government towards industrial development. It is an anomaly which should be removed at the earliest opportunity. Last year, the Indian Government purchased wheat and indigo in India for the English Government. The same solicitude should have prompted the former to acquire through the English Government some dyes at least for the Indian dyers. The want of such solicitude was keenly felt by the dyers. Then, the want of check on the import of dyed yarns, especially 20s, 26s, and 40s. Turkey red, created much heart burning. The dyers expected that at least that portion of the dyes used in dyeing yarns to be exported to India, could be acquired for them in order to keep their industry going. They were baffled in their expectation and they rushed to the conclusion that the Government did not sympathise with them. They still consider that their industry is assailed by the English dyer. On matters like these the Government ought to bestow their attention and meet the people's wishes.

The Government must make primary education free and compulsory and extend elementary instruction in chemistry in schools so that the country may produce a race of chemists. Many centres must be created for imparting technical and scientific education. Every high school and every college must provide industrial instruction to the students, so that they may not look to the Government alone for a job or commercial houses, to rot there life-long as clever and reliable book-keepers or short hand typists. The high schools and colleges must prepare the students to enter the industrial field and run an industry, may be a cottage industry, or one that is capable of being developed into a factory industry and fit for being conducted by a private company. What industries should be taught in the high schools and colleges, should depend upon the students' mental calibre. What industries should be attached to high schools and colleges in particular localities should depend upon the requirements of the localities and the raw products and the other facilities available there.

Tanning, oil pressing, purification of oils, manufacture of scented oils, soaps, candles, glass, and perfumes, preserving of fruits, carpentry, smithy, weaving of blankets weaving on power driven looms, dyeing cotton, wool, and silk, calico printing, manufacture of heavy chemicals, conversion of hill and other products into finished products, manufacture of pharmaceuticals and photographic chemicals are some of the lines that can be taken up as work to start with. Sugar manufacture is the most desirable and the most neglected.

Along with industrial education, commercial education should go *pari passu* for the success of an industry depends as much on business management as an expert knowledge The business manager must know something of the industry, and the expert, something of business.

The people must themselves turn a new leaf. They must wean themselves from self-consciousness which is wrongly understood as synonymous with self-confidence. They must cultivate enterprising and inquiring spirit. The capitalist should turn from egotism and evince genuine good feeling towards the expert. So long as the capitalist wants a handsome profit over and above 9 to 12 per cent interest on his capital he cannot apply himself heart and soul to an industry. The people must eschew the principle of maximum of happiness to minimum of men and spread the principle and work towards the achievement of a "Minimum of happiness (or, if possible, maximum of happiness) to maximum of men".

Dyeing industry.

I shall now turn to the important dyeing industry. This industry in Madura was started long, long ago and solely depended upon natural dyes available in South India until alizarin red and aniline colours came in about twenty-five years ago. Since the advent of these colours, the industry by rapid strides developed into a big one and reached a stage midway between the cottage and mill stages. The war has now laid the axe at the root of such an industry.

The quantity and value of cotton yarns and pieces dyed annually in the days of natural dyes hold no comparison with those of the period just before the war. According to my estimate then, the quantity of yarn dyed annually with alizarin red alone was 5 million pounds, worth about 2.5 million rupees. The value of the alizarin red dye used therein was 3.5 lakhs of rupees. The yarn when dyed was valued at 3.5 million rupees. If one would consider the host of other shades produced in Madura, one will find that the yarn quantity is twice five million pounds if not more. One regrettable outstanding feature and yet unavoidable is that this important South Indian industry is at the mercy of the foreign dye manufacturer.

This industry has another votary in Salem, not to speak of other less important places.

Though the present ubiquitous war has affected the dyeing industry everywhere, still the collapse cannot remain for ever. Excepting weaving there is probably no other industry which better demands and deserves the best attention and encouragement from the Government than the dyeing industry. The industry requires development. Chrome yellow, chrome orange, chrome green, aniline black, alizarin pink and Turkey red are not yet dyed in Madura to any large extent and yarns of these shades are still freely imported from foreign countries. Some dyers have made their maiden attempts to dye chrome yellow and aniline black with varying degrees of success. If they had at their back the necessary technical knowledge they would have had uniform success.

At present, the dyers employ only empirical methods in dyeing or they follow the recipes of the dye manufacturers with slight modifications, and do not know the fundamental principles underlying the processes. For instance they do not know why common salt is used in dyeing dark shades with direct colours or why a less quantity or no salt, is advised in dyeing light shade with the same colours. They do not know why soda is added to a dye bath. In the dyeing of a real colour they do not make out whether a defect is due to a want or an excess of alkali or reducing agent. If there is a defect by adding one or the other, he has to adjust the bath which means waste of dye materials and sometimes the yarn. In all Madura except one factory which has got the semblance of a laboratory no other has one. What a wonder that many a factory does not possess a sensitive small balance for weighing small quantities of materials for sample dyeing; very often match sticks or seeds or small silver coins are used as weights. In their ignorance they do not attach importance to the laboratory trials and correct weighing of materials.

When there is no rationale about an industry possible of development in these days of competition by men of knowledge the industry is sure to go to the wall in the end.

Dyeing school.

To dispel the ignorance of the dyer, to place the industry on a sounder basis and to substitute the unskilled maistry with skilled foremen who know the work, Madura needs urgently a dyeing school. Thanks to the Government of Madras they have sanctioned one to be attached to the local Technical Institute for the accommodation o which a building is now in construction. In order that the school may be of the utmost practical use, it must be provided with an up to date and fully equipped laboratory an a demonstration factory. In fulness of time the Madura dyers will deem this school a a blessing when they can get qualified men to be at the helm of their factory, men wh know the properties of water, the materials to be dyed, the dyestuffs and chemicals an who understand the relation of these to each other, men who can match given shade with the least waste and correct defects that so often trouble the dyer.

In order that the Dyeing School may be of maximum benefit it is essential tha instruction must be given in the vernacular of the country as they do in the Calabava Institute in Baroda. At present the Madras Dyeing Expert is a European who canno employ the medium of the vernacular very conveniently and he should be therefor given the assistance of an Indian gentleman knowing the vernaculars. In any case considering that the jurisdiction of the expert extends over the whole Presidency, h would necessarily require some assistance to spread the beneficial influence of the dyein section of the Department of Industries over such a big area.

The course of instruction should be divided into two—lower and higher grade The lower grade will be open to all non-English knowing candidates such as are sen from amongst the maistris or labourers by the factory owners or such of those a wish to equip themselves with practical knowledge to fit them as skilled maistris o workmen. The higher grade will admit candidates with not less than Matriculatio or School Final standard of education who will receive both theoretical and practica instruction. The Lower grade course may extend from six to twelve months and th higher grade from one to two years. The lower-grade will be in charge of Assistant and the higher grade in charge of the Dyeing Expert.

Calico printing is very closely allied to the dyeing industry and there is very littl of it in India. About two or three years ago, I heard that the only calico printin mills, which were doing excellent work, had to close down owing to European compet tion. Though statistics are not at hand, I can vouchsafe that the quantity of printe fabrics coming into India is enormous as is evidenced by the spectacle of cloth shops i towns and villages. Hand-printing is becoming obsolete and in these days of machine and quick work it is strange to see that it is clinging to the fancy of some people. B very soon it is bound to make room for the machine printed fabrics. Considering t large consumption of cheap printed fabrics and the close relation of printing to t dyeing industry, it is essential that it must be stimulated into a big industry holdi its position on a level with that of other countries.

Bleaching and mercerising are yet others that are allied to the dyeing indust which require to be cultivated and developed. In foreign countries new processes bleaching are being adopted from time to time with a view to make it cheaper. T latest and most economical process is electrolytic bleaching.

The Dyeing School at Madura will do well to take up these subjects also and coa up the students in them.

Demonstration factories.

I have referred to the demonstration factory. It is quite an indispensable thing in the practical teaching of dyeing, calico-printing, bleaching and mercerising. But in a place like Madura a pioneer factory is a more useful institution. In this factory along with bleaching and mercerising the dyeing of chrome yellow, chrome orange, chrome green, alizarin pink and Turkey red may be undertaken without prejudice to, and fear of competition against, the other classes of dyeing already practised by the dyers. The Madura dyers will contribute the whole working capital provided the Government give them the machinery and building. They will undertake to pay the value of the machinery and building in instalments out of the profits, after defraying all charges including dividend at 6 per cent per annum. The required site will have to be given free.

Though they would like to work the factory themselves they would not object to Government supervision on the business side. Though the Dyeing Expert will have to place the factory on a working basis in the beginning, they will have their own trained man to attend to the technical side and will indent upon the Dyeing Expert's help wherever necessary.

Co-operative societies.

The value of the auxiliaries such as ground-nut oil, kaya leaves, saraikati (kelp), soda ash, caustic soda, etc. that are now in use in the dyeing industry is not small. At present, the individual dyers purchase wholesale what is required for the year or in retail according to their financial ability. The wholesale purchase has always an advantage in price over the others. If a co-operative stores for the dyers requirements in auxiliaries is started the advantage will be greater and evenly distributed among all. The dyers are themselves conscious of it but would not work up the scheme because they do not wish to take a part of their capital and invest it in what looks to be a separate business. Again they are afraid of possible mismanagement. But if the Government has a concern in the stores that will infuse confidence in them. Where the people are timid and lacking in enterprise, it is but meet that the Government should inspire them. The Government may give a loan to the extent of half or two-thirds of the capital at a low rate of interest. Such stores will be under a Board of Directors elected amongst the shareholders and another Director to be nominated by the Government. The Government nominee ought not to be below the rank of a Collector, if the Director of Industries or one of his assistant experts cannot conveniently be a Director.

So far as Kaya leaves and Vembadam pattai (Ventilago Madraspatna) are concerned, they must be eliminated from the list of minor hill products sold in auction yearly by the Forest Department. Free permit to collect these may be issued. In the case of fuel, for the dearness of which Madura is notorious, some arrangement must be made in virtue of which the dyers will get it very cheap.

Weaving industry.

Another important industry in Madura and round it is the weaving industry. In Madura city alone there are about 10,000 weavers mostly belonging to one community—the Sourashtra community which almost monopolises the dyeing industry too. It is a good move that the Government of Madras maintains a weaving section under the Industries Department and has sanctioned a Weaving school attached to the Technical Institute in Madura to which a reference has already been made. At present, there is no weaving expert in the proper sense of the word—a man having the theoretical and practical knowledge of weaving in its diverse aspects. The Superintendent of one of the peripatetic weaving parties whom I know perhaps has never woven a yard of ordinary cloth. I mean no offence against him. He is a well meaning man, for aught I know. But I doubt if such an one can bring conviction to the conservative weaver. It is a wonder to me that the Government has not availed itself of the services of a fully trained England returned Indian textile expert who has got the advantage of being able to speak to the weavers in their own languages, knowing as he does more than one vernacular language. I am not aware if the peripatetic weaving parties have done any work in such a large weaving centre as Madura.

To my mind, it appears that any improvements in the present system of hand loom-weaving cannot materially alter the condition of the weaver to his advantage.

There are three classes of weaving, namely, weaving women's coarse sarees and men's dhoties with such counts of yarns as 16*s*. to 80*s*.; weaving finer counts, 100*s*. to 180*s*. with or without gold thread or silk borders or with or without sewn on or ordinary designs in them; and weaving costlier sarees with silk and gold thread—sarees such as the whole body provides the ground on which an elaborate design with gold thread is woven.

So far the improvements attempted to be made have been in respect of the first mentioned class of weaving. The improvement lies in the substitution of the fly shuttle in place of the hand loom. While the fly shuttle enables the weaver to produce more quantity than the hand loom, the quality of the fly shuttle loom product is inferior to that of the hand loom product. So the difference in value of the respective products makes up for the difference in quantity. That is why the weaver does not wish to change his hand loom for the fly shuttle. Then again, all about us we see that mill-made cotton fabrics are in extensive use. Imports of sarees and dhoties in imitation of the hand loom products of India with borders to suit the Indian fancy are coming in plentifully and certainly hand looms cannot tide over the mill competition. That is why the material condition of the weaver who is not skilled and who cannot weave the other two classes of cloths is deteriorating. By slow degrees, yet steadily and surely, the hand loom weaving, so far as coarse products of the first mentioned class are concerned, is bound to give a wide berth to the mill industry. The best thing, therefore, would be for the Government to advise the weaving communities to take to power loom weaving and to make a start itself in co-operating with the would-be private companies.

As regards the other two classes of products, it will be a long time before they can be turned on to the machine and the Government weaving section of the Industries Department must look to the improvement of the productive capacity in these two classes. The best way to do that will be to employ weaving experts such men as have had a thorough training in textile engineering and can quickly grasp the minutest details of the Indian looms and weaving thereon. Such an expert must keep himself in intimate touch with the skilled weavers and suggest to them improved methods on the one hand and train others in skilled weaving. The value of the man will lie in the multiplication of the number of skilled workmen and in the introduction of simpler parts in the looms to warrant perfection of quality and augment the productive capacity.

In this connection, springs to my mind the question of mass education. Unless the weaver has sufficient elementary education and knows the three R's, the expert is sure to feel his task very troublesome. If the weaver is too ignorant, as is the case now, he cannot appreciate the difference between the old and improved methods of weaving. He cannot calculate the saving of time and money that is effected by his passing from conservatism and adopting more efficient and economical methods. He cannot value the benefits of co-operation, organization and system. At present, in his ignorance and poverty he is a prey to the middleman.

The importance of educating the weaver cannot better be impressed than by pointing out that want of education on the part of weavers was the sole cause of the collapse of the Meenatchi Weaving Factory in Madura. This factory during the short space of four or five years before 1911 removed the odium attached to the Madura hand loom products as the most inferior quality in the market, so much so, that the demand for the products of this factory increased. Orders came from Bombay and Bengal Presidencies not to mention the Madras Presidency. The uneducated stupid weavers thought that system was a shackle on their independence and the strength of the weaving staff steadily fell from 200 to 10 or 15, when there was no other course left for the proprietors than to wind up the concern with a tangible loss.

Besides providing for mass education, the Government must encourage co-operative movement amongst the weavers, by starting co-operative stores for them and contributing money towards the capital of a co-operative stores in the shape of a loan at a low rate of interest.

Financial aid.

At present, in Madura, the capital comes from the individual who undertakes to do a business or run an industry. He can command credit in the market to the extent of his capital (which comprises the cash, the landed property and the jewels) or more than that sometimes in the shape of cash and materials. The interest he has to pay is generally 9 per cent per annum. The present system of bank loans makes the rich richer. But a man with business capacity or industrial knowledge minus capital cannot expect any help from a bank. It is said that in Germany, the bank has on its staff commercial and technical men, and that, when a business or technical man applies for help and produces his prospectus the bank weighs the merits of the undertaking. If it is a promising one, the man is given all the necessary financial help and such support as the status of the bank would vouchsafe. This sort of help and support gives a marvellous impetus to the growth of industrial knowledge. Sir Frederick Nicholson of the Madras Fisheries Department refers to the splendid system of agricultural banks in Germany and says that many of the large banks there have done for industry much the same thing that agricultural banks do for agriculture. Such a help is a desideratum in India.

If only such a co-operation had existed between a bank and the patentee of the Lord Ampthill Patent Loom which has simplified the weaving of elaborate designs with gold thread on silk and fine cotton grounds, minimized the cost of production and has stimulated a very large consumption of imported French gold thread, the patentee would not have become the pauper that he is now nor would he have been in costly civil suits. This man had some more improvements on hand and would not now put them on the market on account of his nasty experience with his first patent.

The Gold Thread Factory in Royapuram is another sad spectacle of individual enterprise coming to grief. Its present condition is partly due to the unwisdom of the man in being anxious to run it himself and pocket all the profits. But the offer of financial aid by a bank or the support of the Government in the matter of finance and its endeavour to make it a limited company would have surely tended to the success of the factory. Once the Government of Madras proffered technical help, but what the man wanted was money which was not forthcoming. Even now it is not too late to revive the factory and place it on a working basis.

Government assistance.

No fixed and rigid method can or need be suggested. According to the circumstances of the times, the needs of the industry, the importance of the place or the abilities of the company concerned, the aid may be of any of the forms enumerated in question 5, chapter 1. Regarding Government control to aided industrial concerns, a sympathetic control based on commercial usefulness is quite necessary and welcome.

Technical aid.

Generally speaking, the Dyeing Expert, whose work I have been able to follow, could have done much more than he has done to dyeing industry, but for the school that is yet to come into being and the war that has impeded the progress of the industry. However, the presence of an expert has been a matter of much consolation in so far as doubts on dyeing problems and defects in methods can always be cleared.

The Scientific and Technical Department of the Imperial Institute and the Advisory Council for Research in the United Kingdom, being far off and not knowing the Indian conditions can be only of remote help. The only help that we can depend upon them for will be in regard to makers that may be above the ability of local experts.

Commercial museums.

Commercial museums are very good. Each province must have a permanent museum. Each taluk and district of any industrial and commercial interest must have a museum. Though the collections may be the property of particular museums they must be inter-loanable.

Exhibitions.

The industrial exhibitions are not of value. The latest Madras Exhibition was one in evidence. First of all, the visitors are pleasure-bent. The crowd of such visitors is an impediment to one who is really interested in an exhibit. Then the tamasha of the place diverts the attention of the examiner of an exhibit to more luring objects. So, whatever money, time and energy are spent on the exhibitions may most advantageously be devoted to the museums.

Trade representatives.

They are useful. Each province may have a representative abroad representing one or two important trades or more than that in case of minor trades. The trade representative must have two functions, one to look for the markets wherein the articles of his province can be sold and to report about the requirements of the markets or to suggest improvements in the articles as per demand of the markets, and the other, to report on such local industries as may profitably be started in his province. If the trade representative is a shrewd business and technical man there is no limit to the use which he will be to the cause of his province. Wherever an Indian is available for such work he must be preferred to an European.

Government patronage.

This is quite necessary and the lists of imported articles and locally produced articles that are taken up by the Government for its use may be made available through the commercial museums.

Official organisation.

There should be a Director of Industries with technical experts as his assistants, as there is now in Madras. But there is no use the Director being a man of the Indian Civil Service. He must possess ample commercial knowledge in the light of which he can test the commercial value of the proposals or schemes brought forward by his technical expert assistants. It is essential that he must be assisted and guided by an Advisory Board of Industries, so that, when a scheme is launched there may be the least chance of failure. It is only through such a Board consisting of industrialists of known-ability that public opinion can be won and the usefulness of the department can be projected. There is no use of an Imperial Department; it cannot handle usefully the details of provincial requirements. On the other hand, the reports of the doings of the Provincial Department of Industries must be exchanged amongst themselves for the fullest benefit of the people.

In conclusion, I have to make one general statement about what would above all conduce to the industrial and financial prosperity of the country. India is a big country. Many of her sons have imbibed the benefits of the Western civilization under the sunny influence of higher education. The people have had a close touch with the rulers and have studied through observation and criticism the administrative methods. If India is, therefore, given the management of her own financial affairs she would put her house in order with regard to industries and commerce. She would have a control over exports and imports, such a control as would conduce to economical management of the State and to the raising of her status in the scale of nations.

NOTE.—*Witness did not give oral evidence.*

WITNESS No. 260.

REV. C. DAWSON, *Superintendent and Manager, Wesleyan Mission Industrial School, Karur.*

WRITTEN EVIDENCE.

Training of labour.

Q. 44.—The Wesleyan Mission Industrial School, Karur, teaches cabinet-making, weaving, blacksmithery, rattan-work, and drawing. In the following remarks, however, it should be clearly understood that I refer more especially to the cabinet-making, which is our principal industry.

The primary purpose of an industrial school in India is, I take it, the training of skilled workmen. To attain that end, roughly speaking, two methods of training are advocated. These we may name the school method and the shop or apprenticeship method. There is no need for me to enlarge upon these methods in detail, but my own opinion is that industrial school training to be ideal should be a combination of the two methods—

1. Instruction classes must be provided.

2. A certain amount of time must be given at the beginning of a boy's training to mere practice work,—making of joints, etc.—in which absolute accuracy must be insisted on.

3. As soon as a boy has learned to handle his tools, and to use them with some accuracy, he should be put on serious, marketable work. To get the best out of the boy he must be made to realise that a responsibility rests on him, and that careless, inaccurate work means loss not only to himself but to the institution.

I believe that the junior student learns far more by acting as hanger-on to a skilled workman than by being kept indefinitely working at mere exercise work which is of no marketable value. It is obvious that a boy will take more interest and pride and care in his work if he knows that it is of value than he will in merely "wasting timber."

There is one danger that must be guarded against in an institution run on these lines, and that is the exploitation of the boys' labour. If a boy is put on marketable work there is a danger of coming to look upon him merely as a money-making proposition; his labour is cheap, and by his employment profits may be increased. It is hardly necessary to point out the evil of such a conception of the boys' position in a school. It would, for one thing, certainly result in slip-shod, inaccurate work, which would be countenanced by the commercially minded superintendent, whose chief concern is the increase of his profit. Slip-shod and inaccurate work must on no account be permitted in an industrial school, and though the students should be put on marketable work at as early a stage as possible, the superintendent must be ready to lose money rather than pass an imperfect article.

Turning to the commercial side of the subject, it is self-evident that, other things being equal, the more successful a school is as a business concern the better it will be as a training ground for students. If an institution is paying its way and making a fair profit, it means that work is plentiful, methods are more or less correct, and the atmosphere of the place is good. On the other hand, if the institution is for any reason whatsoever running at a loss, it is not likely to prove an ideal training ground for students.

Now there are many and special difficulties in the way of running an industrial school at a profit,—

1. The working expenses are heavy.

2. The necessity of keeping up the standard of the work turned out, and the consequent impossibility of doing "cheap" work, make it very difficult to compete with private firms that turn out shoddy work made of inferior material.

4. We cannot purchase stores at wholesale rates.

If I may do so, I should like to mention briefly the lines along which Government might help the industrial schools to compete on more equal terms with the private manufacturer. Let me say, however, that I only want *help to compete*, not any undue advantage over the private manufacturer.

1. A Department might be formed under the Director of Industries for the supply of all "Stores",—such as hardware for cabinet-making, yarn for weaving, etc.—to industrial schools at *wholesale prices*. Retail prices at present increase the cost of production considerably.

2. Timber from the Government timber depôts might be sold to recognised schools at a reduced rate.

ORAL EVIDENCE, 7TH FEBRUARY 1917.

Sir F. H. Stewart.—*Q.* You are the Superintendent of the Wesleyan Mission Industrial School, Karur? How long has that school been in existence?—*A.* It was founded in the time of the great famine in 1876-77 as an orphanage.

Q. And how long have you been in charge?—*A.* I have been in full charge since August 1914. I have been more or less connected with the place for the last five years.

Q. How many boys have you got?—*A.* About 65.

Q. What age are the boys?—*A.* They are anything from about eleven to twenty-two. The average age is about sixteen.

Q. Have you got proper workshops there?—*A.* Yes. We teach cabinet-making, blacksmithery, weaving and drawing.

Q. You say, " To get the best out of the boy he must be made to realise that a responsibility rests on him." Do you pay your boys?—*A.* Yes. We pay them one year after they pass the elementary examination at the rate of two annas a day, and later, of course, the pay rises proportionately. Until then they only receive pocket-money. We have a Christian hostel, but we have also Hindu boys in the shops but they live out. The Hindus are mostly boys from the town who come to learn carpentry or weaving.

Q. Is your school self-supporting?—*A.* It does not pay at present. We are very badly hit owing to the war, but normally it pays. During the half year ending September 1915 we made a profit of over Rs. 3,000. But this year we have had rather a severe loss. I do not see why the school should not be made to pay its way in normal times.

Q. What do you do with the profits you make? Are they devoted to the extension of the school, or are they added to the general Mission funds?—*A.* Not to the general Mission funds. The hostel received an endowment from friends in England Rs. 17,500 of which has been invested in the Industrial school. Interest has to be paid on this capital, and on any loans that we may ask from the Mission in bad years. All profits are used in the repayment of such loans and in improvements to the school such as the erection of new buildings, and the installation of new machinery.

Q. You suggest means by which the Government might enable you to compete with the private manufacturer on more equitable terms, but it would be equally hard if the private manufacturer did not get any assistance?—*A.* The private manufacturer has not our working expenses.

Q. In what way?—*A.* We have to keep up a big staff and big premises. The private manufacturer is generally a man in a comparatively small way without expensive premises and maistries to pay for.

Q. That is what I mean. You are quite clear that any profit that you can make goes to the extension of this useful work?—*A.* It all goes to the school. Absolutely nothing goes to the Mission.

Q. Who inspects your school?—*A.* The Director of Industries.

Q. You have nothing to do with the Director of Public Instruction?—*A.* No.

Mr. A. Chatterton.—All the industrial schools in the Madras Presidency are entirely under the Director of Industries.

Sir F. H. Stewart.—*Q.* The gist of your note is that practical work is absolutely necessary and at the same time there should be instruction classes?—*A.* For the class of boys we train practical work is *the work*. Our purpose is not to train maistries, really, but skilled workmen. Of course, clever boys can be chosen from amongst the students and given special training and special opportunities, but the average student is not likely to be fit for anything higher than the position of a skilled workman.

Q. You say you have about 65 boys? Is that a fairly average number?—*A.* Yes. We shall have more shortly. In conjunction with Mr. Couchman when he was acting as Director of Industries, we arranged a scheme by which we are going to take boys from a caste of Pariahs in the Karur and Dharapuram taluks to train them in weaving with the idea of sending them back to their villages with looms of their own in order that they may be encouraged to stay in their villages and develop the weaving industry, which is already more or less their caste industry, instead of going to the plantations in the hills for a great part of the year.

Q. Do you receive fees from the boys?—*A.* They are not always willing to pay fees. We charge fees for the hostel. Very often boys who fail in or show little aptitude for scholastic work are sent to us. Their parents have apparently spent a lot of money on them and they send them to us as a last resort, and are not too keen on spending any more money on them. If we could reduce our fees, or if we could obtain funds to enable us to attract boys by reduced fees, we could get double the number of boys almost at once.

Q. And you could teach them?—*A.* Yes. We have sufficient accommodation and staff.

Q. How much does it cost a boy to come to the school and live in the hostel?—*A.* I charge only from Rs. 3 to Rs. 4 a month.

Q. That includes the whole thing—living in the hostel and attending the school?—*A.* Yes. I charge no fees for those who do not live in the hostel. I insist on the parents signing a bond to keep the boys with us for five years. For the first two years they are of no use to us, but afterwards they are more or less profitable.

Q. When do they pass the elementary examination?—*A.* Some of them pass in one year. The younger boys take two years.

Q. And you give them two annas a day?—*A.* One year after they pass the examination. At the end of their fifth year they are getting about four annas a day, and if they care to stay on afterwards we give them eight annas at once, with an increase in a few months.

Q. Where is your school?—*A.* Our school is half way between Trichinopoly and Erode.

Q. Is it a centre with a large population?—*A.* Karur is a town with a population of about 16,000.

Mr. C. E. Low.—*Q.* Do you get a Government grant-in-aid?—*A.* Rs. 2,800.

Q. In consideration of any particular conditions?—*A.* I do not know what the conditions they laid down at the beginning were. We have to keep the school up to Government standard and maintain our staff of maistries. The Director of Industries inspects the school.

Q. Do you get any assistance from those inspections, or are they merely done for the Government grant?—*A.* Personally I have not received much assistance.

Q. With regard to wood workers, is there a demand for these men's services when they have been trained?—*A.* Yes.

Q. In the towns?—*A.* Yes, in the factories. We cannot train carpenters for village work. The standard of training is much too high for village work. It is otherwise with weavers.

Q. You never tried to train men for village work, e.g., for small engines?—*A.* We have two engines and we train drivers who are able after staying with us a year or two to get good posts.

Q. These men work in the villages?—*A.* In the towns in the rice mills generally. One or two have gone to the Director of Industries and are being employed by him.

Q. With reference to the question of these village carpenters, you do not think that there are a number of village implements which you can teach them to turn out much more efficiently?—*A.* I do not know that they can do this work more efficiently than the village carpenter. A carpenter does not need our training to turn out this kind of work. I do not speak as an authority, but this is my personal opinion.

Hon'ble Sir R. N. Mookerjee.—*Q.* You say you have an orphanage?—*A.* The institution was started as an orphanage in the famine time. Now it is not an orphanage.

Q. And the hostel you have got is only for Christian boys?—*A.* Yes. We have one or two Hindu boys in it, but of course, they have to submit to the same rules as the Christian boys and they live with them.

Q. Those who come there—the fifty or sixty boys—are Christians. They come as Christians?—*A.* They come as Christians, except in the case of one or two boys who have voluntarily come from a distance.

Q. You have not arranged for a Hindu hostel?—*A.* It is not worth while.

Q. You do not get so many boys?—*A.* Karur is not a great centre like Trichinopoly or Madura.

Q. Have these Christian boys got primary education before they come to you, or do you give them any education in addition to this carpentry and industrial education?—*A.* There is a primary school connected with the hostel in which boys are educated up to the 4th standard. The younger boys who come to the workshops are given half-time in the shops and spend the other half in the school, until they reach the 4th standard. I have no evening classes at present, but I am intending to start evening classes in connection with the new weaving students who are coming.

Mr. A. Chatterton.—*Q.* You are the manager of this Wesleyan Mission Industrial School?—*A.* Yes.

Q. Who is in charge of the worksop?—*A.* Myself. We usually have a layman in charge, but he left just about the time the war started, and it is utterly impossible to get another man from England until the close of the war.

Q. Have you had any training at all as a carpenter?—*A.* I was an engineer before I became a missionary.

Q. Formerly you always had a well-trained mechanic and a carpenter in the workshops?—*A.* Yes.

Q. And is it the intention of the Mission to get such a man?—*A.* Certainly, we shall get a man as soon as we can.

Q. You told Sir Francis Stewart that you are under the Director of Industries for the purposes of inspection, and that the school is placed under the control of that Department?—*A*. Yes.

Q. You also said that your boys are prepared for the elementary technical examinations. That examination is conducted by the Department of Education? You send your boys to what are called Government Technical Examinations?—*A*. Yes. That examination is conducted by the Department of Education.

Q. Practically, these Government technical examinations control the work of the school?—*A*. No. I do not see how they control the work of the school. We send boys up for examination simply because the boys cannot get posts afterwards unless they have passed the examination. If we do not send them up our grant will be stopped, in that way the examinations control the work of the school.

Q. There are three grades of examination—elementary, Intermediate and Advanced?—*A*. Yes.

Q. And what portion of your boys go through the whole course and get advanced certificate?—*A*. I cannot tell you exactly, but since I have been in the school I suppose there have been on an average five a year in carpentry.

Q. You send boys up for the Government technical examinations in blacksmithery and tinsmithery?—A. Not tinsmithery.

Q. In weaving and blacksmith's work?—*A*. Yes. There is no advanced examination in blacksmithery.

Q. Do you consider that these Government technical examinations are a suitable test of the work done by your boys at school?—*A*. Sometimes a very suitable test, but at other times, no.

Q. Are the examinations held in the school, or do you send your boys up to Madras?—*A*. They are held in the school.

Q. You said that you get a grant-in-aid from Government of Rs. 2,800 a year?—*A*. Yes.

Q. Do you get any other grants in the form of scholarships?—*A*. We get scholarships. Since last April we have been getting Rs. 51 a month in the form of scholarship from Government in addition to the Rs. 2,800, but of course, the greater part of that money goes to the boys themselves. Two-thirds go to the boys and only one-third to the school as tuition fee. A boy in the advanced class will get a scholarship of Rs. 9, and Rs. 3 out of it will go to the school as tuition fee.

Q. Out of the remaining Rs. 6 he has got to pay Rs. 3 for hostel?—*A*. Yes.

Q. Besides this grant, you get a grant of half the salary of the Chief Instructor or Manager?—*A*. No. We get no other grant at all.

Q. What do you usually pay to this Chief Instructor, that is, the Superintendent?—*A*. I think he used to get about Rs. 280 a month. Half of that came from the Mission and the other half from the school, and nothing from Government.

Q. And in addition to that, you provide him with free house?—*A*. Yes.

Q. You said that boys come to school from the age of eleven?—*A*. That is the limit. But now and then, for various reasons, we do take a boy so young. When we do, we put him on rattan work so that he does not begin his cabinet making course for some considerable time afterwards when he is strong enough to use tools.

Q. How many boys have you got in the weaving section?—*A*. We have only about eight boys now but we are extending it. Government have promised a special grant, to enable us to take twenty five boys in the weaving department.

Q. What class of weaving do you teach these boys? Is it the weaving of sarees and country cloths, or is it mainly confined to the class of work turned out by the Basel Mission?—*A*. We do not turn out such fine work as the Basel Mission. We do all the ordinary kinds of plain weaving.

Q. It is a coarse kind of work?—*A*. Yes, to a large extent.

Q. And do these people who learn weaving get employment afterwards?—*A*. Yes.

Q Have you got any modern equipment in the weaving section?—*A*. Just the ordinary handloom.

Q. You say that the school was making a profit of Rs. 3,000. That is including all Government grants?—*A*. Yes.

Q. If you excluded the Government grants?—*A*. It would be just paying its way.

Q. What is the outturn of the school roughly?—*A*. It varies so much. In the half year ending 30th September 1914 the carpentry section sales were for Rs. 17,000. In the corresponding half-year in 1915 these sales totalled about Rs. 10,000, and in the six months ending September 30th last only Rs. 3,400. The heavy falling off shown in the last figure is due to effects of the war upon our orders.

Q. Do you get any scholarships from the Coimbatore District Board?—*A*. No. We are not now in the Coimbatore district. We are in the Trichinopoly district, and we have one scholarship from the Trichinopoly District Board.

Q. You have stated that you take a bond from boys entering the school from their parents to make them serve for five years?—*A*. Yes.

Q. Is there any difficulty in getting them to fulfil the obligations connected with the bond?—*A.* I have had no difficulty yet. There may be difficulties later.

Q. Have there been cases in which the conditions of the bond have been broken?—*A.* My predecessor had such cases, I believe, but I have not had any.

Q. What happened?—*A.* I do not know what he did. I think he found it pretty hopeless. I do not think the bond was of much use to him at all. I do not see why it should be useless.

Q. What becomes of the majority of boys who go out?—*A.* We do not keep a register, but the boys who finish their course are able to get really first rate jobs afterwards.

Q. Most of them go to the Railway Workshops at Perambur or Trichinopoly?—*A.* Some go there. One boy who passed a short time ago got a maistry's job in Bombay on Rs. 30 straight away. Others have gone to private concerns.

Q. What is the particular object of the mission in maintaining the school?—*A.* As a training ground for our Christian lads who are not able to go in for higher education, or who are not fitted for higher education.

Q. These Christian boys are not able to get instruction in the bazaars?—*A.* Not the kind of instruction that we give. The Mission does not want to apprentice them in the bazaar. It is much better to have them for five years in a place where they can be freed to some extent from the influences of the bazaar, and where we can mould their characters and make men of them.

Q. How often has this school been inspected by the Director of Industries? When was the last inspection?—*A.* Mr. Couchman visited the school in the latter half of last year, about August, and since then the Director of Public Instruction has sent a representative.

Q. What has he got to do with the school?—*A.* I do not know. He received instructions from the Director of Public Instruction to inspect the school. Usually we have had the Director of Industries down once or twice a year.

Q. When he comes down he makes suggestions regarding the working of the school or the equipment of the school?—*A.* Mr. Tressler did.

Q. You said to the President that you did not find the inspections of much use?—*A.* I did not say that. I said that I did not receive a great deal of help personally, simply because I did not agree with Mr. Tressler's ideas altogether. He knows this and we talked it over together more than once.

Q. Under the present arrangement, has the Director of Industries who inspects the school any power to insist upon his recommendations being carried out?—*A.* I really cannot tell you.

Q. There is no definite grant-in-aid for these industrial schools?—*A.* I do not know. I do think that it is hard that an industrial school like ours should not be able to get stores at wholesale prices like any other firm. I think we work at a great disadvantage.

Q. If you spend so many thousands of rupees on stores, can't you make your own arrangements for their purchase?—*A.* Firms will not supply us at wholesale rates. I think it would be a very practicable thing for the Department to arrange to supply all schools. Stores could be ordered by the school through the Department.

Q. What you wish to suggest is that the Director of Industries should start a small Stores Department for supplying schools under him with various tools and plant and appliances they want?—*A.* I do not want him to start a Stores Department, but he might make arrangements with some wholesale supplier and schools could order through him. By simply sending our orders to him for endorsement we should then be enabled to purchase our stores at wholesale rates.

Q. Would you be willing to accept the kind of tools and plans that he said were necessary?—*A.* Yes, if he is a practical man.

WITNESS No. 261.

MR. G. A. D. STUART, I.C.S., *Director of Agriculture, Madras.*

WRITTEN EVIDENCE.

From the list of questions I gather that the Commission are not specially interested in agriculture as such, but only in such agricultural industries as are involved in the preparation of raw agricultural products for the market. I gather that the Commission are confining their attention mainly to the larger industries. I have no experience in these last and my connection with agricultural industry has not been of long duration. My remarks will therefore be brief and I will confine myself to such questions as are intimately connected with the working up of the raw products of Madras agriculture.

2. I invite attention to the printed Proceedings of the Agriculture and Trade Conference held at Madras in December 1914 in which many of the subjects in which I have to deal have been discussed at length.

3. *Cotton*—

(*a*) *Ginneries*.—There has been a large increase in the number of small ginneries in recent years. These have saved the pocket of the ryots in the matter of cartage but they have the following two disadvantages:—

(1) Many of them are badly run so that the lint is damaged.

(2) It is impossible to control adulteration and mixing which may take place at a number of small ginneries (vide below).

(*b*) *Adulteration and mixing*.—It has been the aim of the Madras Agricultural Department to improve the local cotton by evolving strains of uniform quality possessing longer and stronger lint and a higher ginning percentage than the ordinary local cotton. In this we have been largely successful. But the ryots who grow these improved strains do not always realise the profits that they are entitled to, owing to the conditions of marketing. Most of the cotton passes through the hands of middlemen before it reaches the mills or exporting firms. These men are adepts at adulterating and mixing. The better varieties are used to grade up poor lots and varieties with poor qualities are deliberately mixed with good cotton.

Thus in Tinnevelly a short staple Bengal cotton, locally known as Pulichai, has appeared during recent years, and this has been largely used to adulterate the longer stapled Tinnevelly cotton. An account of the fight made against this by the Agricultural Department and the local firms is given in the Report of the Agricultural Department of Madras for 1915-16. The fight has been fairly successful, but the main difficulty is with the small ginneries. The mixture can be easily detected—

(1) in the field, (2) in the stage of raw cotton (kappas), (3) at the gin by examining the seed.

But it is not at all easy to detect once the cotton is in the form of lint. This lint may be bought, baled and exported in good faith as Tinnevelly cotton and the fraud discovered only when the cotton is put through the spinning mills. The same considerations apply to the other forms of mixing, i.e., the mixing of ordinary cotton with "Cambodia" and the mixing of the short-stapled "Cocanadas" with "Northerns" at Nandyal.

Any Government control of this adulteration must take the form of the control of ginneries. The fewer and larger these are the easier such control would be. It would therefore seem that Government should be cautious in encouraging the setting up of small ginneries.

(*c*) *Spinning and weaving mills*.—With regard to these I have only to say that local mills have proved of great assistance towards the improvement of cotton by the Agricultural Department. They are directly interested in obtaining cotton of better spinning qualities and are therefore prepared to pay a premium for such cotton. They are also more directly interested in putting down fraudulent adulteration than are mere exporting firms, and they are always willing to assist the Agricultural Department by making special spinning tests of our improved cottons.

4. *Oil-seeds*.—Ground-nut, gingelly (till), castor, coconut.

So far as agriculture is concerned the main point is the advisability of oil crushing in this country so that the oil cake is available for cattle food and manure. Everything possible should be done to encourage the spread of the oil crushing industry in this country. There seems to have been a considerable increase in crushing castor at Bezwada and Cocanada in the last year, and my information is that the cake has been readily absorbed for the manuring of sugarcane in Gōdāvari. One of the difficulties is that the adulteration of oil is less easy to detect than adulteration of raw products. A system of Government testing and certificate for exported oil has been suggested. Madras hand shelled groundnut fetches a lower price for export than the machine shelled nut. This is due to the necessity of damping before hand shelling. Unless very carefully dried afterwards the nuts get hot and go rancid during the voyage to Marseilles. Government should therefore encourage the introduction of small machine decorticators, and this is being done. None of these machines at present in use appear to be entirely satisfactory as they all break from 10 to 20 per cent of the nut. I have received different opinions as to whether broken nuts are a serious disadvantage or not but I think that there is no doubt that consignments containing much broken nuts fetch a lower price than others.

Government might well offer a substantial prize for the most satisfactory decorticator.

5. *Artificial manure industry*.—The possibilities of the manufacture of nitrolim (calcium cyanamide) by hydro-electric power in this Presidency seem to be rather remote. This is however, an important matter which might well be investigated further The most successful artificial manure so far has been superphosphate, for paddy. This is already manufactured in this Presidency and the supply should be able to keep pace with the demand. The cost of manufacture is dependent partly on the price of sulphuric

acid. The manufacture of this acid on a large scale in India would thus indirectly benefit agriculture. Phosphoric acid is available in quantity in the shape of bones which are at present largely exported, and there are large deposits of low grade mineral phosphates in the Trichinopoly district. Research as to the best method of treating these latter in order to make them available as a manure is at present going on in the Research Institute at Coimbatore.

6. *Agricultural implements and machinery.*—i.e., ploughs, harrows, cultivators, [illegible], threshers, winnowers, oil engines and pumps. There is a great and growing demand for oil engines and pumps and a commencement of a demand for iron and steel ploughs. I have little doubt that the demand for all kinds of agricultural implements and machinery will increase steadily in the future. This demand is at present almost entirely met by importation from Europe and America. A local industry in the manufacture of such implements and machinery appears to be very much a thing of the future, but all attempts to establish it deserve to be encouraged.

7. *Sugar and jaggery industry.*—It is generally admitted that the manufacture of crystallised sugar can only be carried on profitably if done on a large scale and in conjunction with a distillery to utilise the waste products. Most of the existing sugar factories use jaggery (both palm and cane) as their raw material. It is only the East Coast Distillery Co.'s factory at Nellikuppam which manufactures sugar direct from cane during the crushing season. The reasons which prevent the expansion of the sugar making industry in this Presidency are given at length in the report of Mr. Chadwick in G.O. No. 205, Revenue, dated 21st January 1915, a copy of which is appended. It is clear from this that an essential to a successful industry is some form of Government control of cane growing. I do not think that there is any possibility of such control being accepted. The prospects of the extension of small jaggery making plants are more hopeful. At present two such plants are being experimentally worked by Government. Further progress would seem to lie in the direction of the extended use of such small plants coupled of course with improvement of canes and cane cultivation.

8. *Indigo.*—There has been a great revival in the manufacture of indigo in Madras owing to the high prices brought about by war. It is fully recognised however that natural indigo can only compete permanently with the synthetic product if the former can be marketed in the form of a uniform paste. To test the possibility of doing this the Government of India have appointed a special chemist * who has I understand demonstrated the possibility of so doing in Bihar. It remains to be seen whether the indigo planters in Bihar can co-operate to produce a standard paste.

The problem in Madras is very difficult. The indigo is at present manufactured in a large number of small vats of which there may be several in one village. It follows that the dried cakes which are produced vary very much in composition even taking no account of the deliberate adulteration which takes place. To replace this system by central factories turning out standard paste, either direct from leaf or from the semi-manufactured ryot's products would prove a difficult, and I am almost afraid, an impossible task.

Nevertheless it must be admitted that the present is the time for such an attempt if it is ever to be made. Many ryots are growing indigo who have forgotten the process of manufacture and have no vats. I have received many enquiries as to the possibilities of disposing of the leaf. Further the work of the Imperial Bacteriologist at Pusa Mr. Hutchinson on the fermentation process of indigo manufacture opens up great possibilities. It may be feasible to increase the yield of dye very largely by the scientific control of the bacterial cultures which are responsible for the fermentation. I therefore think that Government might possibly try an experimental indigo factory in Madras. No firm could be expected to bear the great risks of loss involved in such an experiment.

Again it must be remembered that indigo competes for land with other valuable crops such as cotton and groundnut. If the price of indigo falls heavily after the war the factory might be left with no raw material.

9. I will now deal briefly with one or two of the questions specifically raised by the Commission.

Research abroad.

Q. 21.—The scientific and technical department of the Imperial Institute has been of distinct use to the Madras Agricultural Department in valuing economical products.

Surveys for industrial purposes.

Q. 25-27.—Much valuable information regarding the available resources of the Presidency has already been collected, but much more might be done. The Handbook of Commercial Information recently issued by the Department of Industries which is based largely on information supplied by the Agricultural Department is the sort of thing required. More handbooks of this nature should be published as information accumulates I do not think that a special survey is called for.

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* NOTE.—This officer, Mr. W. A. Davis, has since visited Madras, and a definite scheme for the improvement of Madras indigo has been formulated.

Land policy.

10. Q. 41 to 43.—I have already dealt with this under sugar above. The same consideration would apply to an indigo factory. Undoubtedly a drastic change in the present law that each landowner is entitled to grow what crops he likes on his land would enable sugar, and possibly indigo, industries to be given a much better chance than they have at present. I do not think however that the country would accept any such drastic control.

The improvement of agriculture, which is the basis of many industries, is hampered by the extremely scattered nature of holdings in Madras. This applies especially to irrigated lands much of which is held in minute scattered plots. This system reduces the efficiency of all agricultural operations and hampers the introduction of improvements. There is further the fact of the waste of the land left as a boundary round each plot. Land owning appears to pass through three stages—

First, common ownership with periodical reallotment of the land cultivated. This has nearly died out in Madras, but can still be found.

Second, permanent allotment of definite fields, which are scattered thoughout the village as the result of the previous system, and which tend to become smaller and more scattered on account of the Hindu system of partition. This is the common system in Madras now.

Third, the gradual formation of more compact holdings. This is well marked on unirrigated and garden (well-irrigated) land, and is to be seen on the better irrigated lands in the south of the Presidency.

I think that more might be done to encourage this third process but it would be difficult to do very much unless the Hindu law of partition were altered. The Japanese appear to have tackled this problem both in Japan and Korea.

Another point which indirectly affects industries is the possibility of introducing a system of registration of title (Record of Rights) in Madras. Owing to the intricacies of the Hindu and the Muhammadan laws of property, industrial firms frequently find it difficult to secure a sound title to the land which they require. I believe that this is particularly so in parts of Madras town. The whole question was considered by a committee two years ago and is now before Government.

Technical and scientific departments.

11. The relations between Government and the technical experts employed by them have not always been harmonious in the past. I put this down partly to the non-scientific education of the majority of Government administrative officials which makes it difficult for some of them to appreciate the value of scientific research or the conditions under which research can be successfully conducted. This state of things is not peculiar to India however and we may hope that the lessons taught by the present war will go a long way to remedy it in the future.

The technical and scientific experts employed by Government should, I consider, be divided into—

(a) Those engaged in semi-administrative and educational work.
(b) Those engaged in pure research work.

Class (a) must necessarily be under closer and more localised control than class (b); they are in direct contact with the people of the country and have to carry out the policy of the local Government. They should therefore be controlled by the local Government and should be members of a regular service. The purely research workers, class (b) should be controlled more lightly and they might well be severed altogether from the control of local Governments. They should work in Research Institutes each of which should be run by a non-expert administrator whose duties will comprise the general administration of the Institute with a view to freeing the research experts from all administrative work. This administrator would have nothing to do with the control or valuation of the scientific work of the experts. This should be done by a Board of Experts who would act as advisers to the Imperial Government.

These research experts should either be employed for limited terms of years, with the option of re-employment or if they are in a regular service the terms of employment should admit of both compulsory retirement and optional resignation at suitable intervals, with proportionate pensions. This, on the one hand, would enable Government to get rid of men who had been tried and found wanting, and on the other hand would compel better payment and treatment of experts. The existing ideas as to the pay suitable for all class of scientific and technical experts require considerable expansion. The terms offered at present are perhaps sufficient at the start, but more provision should be made for substantial increase in the pay of experts who have proved their worth.

Considering the great size of India I am not in favour of specialised Research Institutes for all India. A possible exception might be urged in the case of chemistry, but even here research work in agricultural chemistry and in much industrial chemistry must necessarily be localised. The attempt at setting up a Research Institute for Agricultural Science for all India at Pusa has certainly failed so far as Madras is concerned, and a separate Research Institute for Tropical Agriculture is needed.

Certificates of quality.

12. *Q.* 89.—At present the Agricultural Department gives certificates of quality to ryots growing our improved cotton and these have enabled them to obtain better prices. Any great expansion of this system would entail the employment of a very large staff. But such expansion should not be necessary once the whole of the cotton of a tract has been graded up.

A comprehensive system of compulsory certificates of purity, or in the alternative a drastic penalising of adulteration, for say, cotton, oil and indigo sounds tempting. But the large staff which would be needed and the impossibility of adequate control put the idea, in my opinion, outside the range of practical politics.

SUGAR FACTORIES IN THE MADRAS PRESIDENCY.

G.O. No. 205, *Revenue, dated* 21*st January* 1915.

READ—the following papers :—

I

Official Memorandum No. 2931-*C*/13-1, *Revenue, dated* 22*nd November* 1913.

With reference to the answer given to question No. 142 (*a*) asked at the meeting of the Legislative Council held on 11th November 1913, the Board of Revenue is requested to enquire into the conditions of the sugar factories in the Madras Presidency, ascertain why indigenous sugar has not been successful in competing with foreign imported sugar and submit a report to Government in consultation with the Officer in charge of the Pumping and Boring Operations.

(By order)

H. A. WATSON,
Under Secretary to Government.

II

Proceedings of the Board of Revenue (*R S., Sur., L. Rds. and Agri.*), *Mis. No.* 3934, *dated* 15*th December* 1914.

The Hon'ble Mr. LL. E. BUCKLEY.

Read—the following papers :—

(i)

Official memorandum—from Government, Revenue Department.
No.—2931-C/13-1.
Dated—the 22nd November 1913.

(ii)

Reference—from the Board of Revenue (Revenue Settlement).
No —2592.
Dated—the 3rd December 1913.

(iii)

Letter—from K. T. B. TRESSLER, Esq., Acting Director of Industries.
To—the Secretary to the Commissioner of Revenue Settlement, Survey, Land Records and Agriculture.
Dated—the 26th June 1914.
No.—162 G.

With reference to Official Memorandum No. 2931-C/13-1, Revenue, dated 22nd November 1913, I have the honour to state that I have made investigations and enquiries regarding the sugar industry and it appears to me clear that the principal reason why indigenous sugar has not been successful in competing with foreign imported sugar is because the sugar factory represents a very large initial outlay and requires a large expert staff to work it, whilst the sugar season only lasts for a small part of the year. Unless, therefore, the factory can be kept fully occupied during the whole of the working season, it is not likely to make a profit.

2. In Java and the British West Indies, every factory either owns or has managing control over at least 4 or 5 thousand acres of sugar plantation and can thus ensure the supply of raw material. In India, sugarcane cultivation is scattered and the quantity grown every year depends entirely on the personal views of the small producer. There is thus no kind of guarantee regarding the supply of raw material and, what is more, even such material as is available cannot always be obtained at a commercial figure.

3. I accordingly do not think that there is any commercial prospect of the sugar industry developing in South India until the factories can obtain control over several thousand acres of cultivation.

(iv)

Letter—from D. T. Chadwick, Esq., I.C.S., Director of Agriculture, Madras.
To—the Secretary to the Commissioner of Revenue Settlement, Survey, Land Records and Agriculture.
Dated—the 12th November 1914.
No.—R. Dis. 2126.

I have the honour to reply to Board's Reference No. 2592, dated 3rd December 1913, and return Mr. Tressler's note received with Board's Reference No. 1359, dated 3rd July 1914. The latter mentions the main need, but overlooks all questions of improvements in varieties and organization of the industry. I have tried to bring out the conditions in other countries which have chiefly made for success therein.

2. The customs figures show the steady increase that has taken place in the imports of sugar into this Presidency—

	Average for five years ending 1910-11.		In 1911-12.		In 1912-13.		In 1913-4.	
—	Quantity in thousands.	Value in lakhs.	Quantity in thousands.	Value in lakhs.	Quantity in thousands.	Value in lakhs.	Quantity in thousands.	Value in lakhs.
	CWT.	RS.	CWT.	RS.	CWT.	RS.	CWT.	RS.
Refined sugar 16 Dutch standard and above.	125	13	251	28·7	567	60	522	52
Unrefined sugar	50	3·5	44·6	3	·01	·1	40	2·6
Molasses	95·5	2·2	62	1	111	2	167	3·5
Confectionery	10·8	3·5	15	5	15	5	15·5	5

Quantity is given in thousands of hundred weights.
Value is given in lakhs of rupees.

The prices of refined sugar during these years has been very fairly steady, viz., Rs. 10-6-0, 11-7-0, 10-9-0 and 9-15-0 a cwt. There has been heavy drop in the last year, yet these prices do not seem so low as to indicate a definite attempt to undermine and capture a market. The vast increase in imports would therefore seem to indicate there was a new and expanding market for sugar opening in Madras which foreign countries are able to supply at prices below those at which Madras can produce the commodity. In other words, we are not keeping pace with the changes resulting from our economic development.

The chief countries from which these imports of refined sugar come are as follows :—

—	Average of five years ending 1910-11.		1911-12.		1912-13.		1913-14.	
	Hundreds of cwts	Lakhs of Rs.	Hundreds of cwts.	Lakhs of Rs.	Hundreds of cwts.	Lakhs of Rs.	Hundreds of cwts.	Lakhs of rupees.
Java	72 6	7·7	190·7	22·6	440	46·7	407	40·0
Mauritius	6	·6	38·7	3·6	42	4·4	54	5·4
Austria Hungary ..	26	2·7	12·7	1·8	68·8	6·9	50	5·0

The large increase in the imports of refined sugar is therefore from Java and Mauritius and it is Java which holds the key of the position.

3. The area under sugarcane in the Presidency for similar years is reported to be as follows :—

Average for five years ending 1910-11.	1911-12.	1912-13.	1913-14.
ACS. 88,621	ACS. 108,032	ACS. 98,887	ACS. 83,837

The juice of the palmyra is also used for the extraction of sugar. The exports of jaggery as such have fluctuated and are as follows for the same years :—

Average for five years ending 1910-11.	1911-12.	1912-13.	1913-14.
In lakhs of rupees.			
8·7	10·26	19·65	8·8

4. So far as sugar is concerned, clearly Java is the country which is of most interest to India; and before examining the conditions which prevail there, it is well to see some of the results they have obtained to appreciate the enormous improvements they have effected.

Year.	Area under cane.	Yield of cane per acre.	Yield of sugar per acre.	Yield of sugar from sugarcane.
	ACS.	TONS.	TONS.	PER CENT.
1840-44	..	..	·809	..
1860-64	..	..	1·499	..
1883	..	..	2·92	..
1888	..	..	3·258	..
1894-95	195,505	30·78	3·012	..
1899-1900	220,440	33·93	3·25	9·57
1909-10	314,335	39·00	4·0	10·88
1910-11	335,591	41·95	4·3	10·26

Thus there has been a steady increase in the area under cane accompanied by

(*a*) an increase in the yield per acre of cane,

(*b*) an increase in the percentage of sugar in the cane.

These, as far as production is concerned, are always the main causes of a cheap final product. The average for Java is now a 42 tons crop of cane per acre capable of yielding $4\frac{3}{16}$ tons of sugar per acre. In Madras the normal recognised outturn for jaggery per acre is $2\frac{1}{4}$ tons—a little more than half, though with the spread of improved canes it is probably now a little more than this. On Samalkōta farm, the average annual yield of jaggery per acre is usually $4\frac{1}{2}$ tons. It has only twice been less than 4 tons. At Taliparamba it is usually about $5\frac{1}{4}$ to 6 tons per acre. But these are on small plots and are not the averages over thousands of acres.

5. The average cost of sugar production—growing and manufacture—in Java is difficult to discover. Mr. Neilson of Nellikuppam, who has enquired into these facts in Java in person and to whom I am very much indebted for much help in this report, put it a few years ago at Rs. 81 a ton. Mr. Keatinge in his recent reports puts it between Rs. 98 and Rs. 180—the usual apparently being Rs. 110 to Rs. 120, i.e., say Rs. 18 to Rs. 27 a candy of 500 lb. of refined sugar in a well managed factory. It is not then surprising that Java can at a profit sell sugar in Madras at about Rs. 40 per candy after paying freight, import duty, etc. There is really only one sugar-refining factory working on modern methods in the Presidency, viz., that belonging to Messrs. Parry & Co., and although they have helped me very considerably I cannot exactly ask them what is their cost of production. Besides they also use very largely palmyra jaggery and at times imported unrefined sugar from Java. Yet these prices of production of refined sugar can be compared with the cost of making jaggery or unrefined sugar from cane in this Presidency.

When jaggery is selling at Rs. 25 or over per candy of 500 lb. the area under cane in Gōdāvari expands; when it falls below Rs. 20 the area tends to contract. Thus, it would appear that the cost of producing and manufacturing refined sugar in Java is comparable with the cost of producing jaggery in India.

6. The question asked is the reason for this. As usual there is no one answer to an economic question of this nature; it is the result of a combination of factors some of which have their origin in history. I will try and mention the main factors in order.

Land and climate.—There is little doubt that the portions of Java devoted to sugarcane possess a very fertile soil and excellent climate for cane. But Madras also in places has good soil.

Method of cultivation.—As far as I can make out, more attention and care is paid to cultivation than is the case in Madras.

Varieties of cane.—Infinitely more work has been done on breeding profitable varieties of cane and on maintaining the stock thereof than in India.

The result of these three factors is that they average a 42-ton crop of cane per acre with a better sucrose content than ours compared with a 24-ton crop per acre of [illegible] in Madras.

As far as one phrase can explain how these advantages have been [illegible] purpose, that phrase is organisation under strict Government control.

7. The organization of the Java sugar industry is the result of history and of action taken with the definite purpose of fostering that industry. When the Dutch East India Company acquired control of Java they found that the native princes
(*a*) owned all the land inalienably;
(*b*) exacted one-fifth of the peasant's labour;
(*c*) also as ground-rent exacted one-fifth of his crops.

The Dutch continued the same system even after the company was dissolved in 1800. Whilst the island was under British rule from 1811—16 Sir Stamford Raffles introduced the new and revolutionary ideas of free ports, free culture and free labour. In 1816 the island was seceded to the Dutch. The free ports were safeguarded by the treaty but the Dutch whilst retaining a certain amount of the new police system re-introduced the old levy of one-fifth of the produce and "obliged the peasants to plant one-fifth of the village land in crops to be sold to the Government at fixed prices; but only demanded one day's labour in seven instead of one day in five."

Most of the land which Sir Stamford Raffles had given to the chiefs and the petty princes soon lapsed to the Government who leased it largely to planters but never sold it. The arrangements for labour were made with the village community through the headman. There was a slump in trade and there were heavy war expenses and Java was rapidly becoming a burden on Holland, when in 1830 Governor Von den Bosch was sent from Holland with extraordinary powers. He introduced the culture system which in later years was destined to excite bitter controversy and to be most severely attacked on moral and ethical grounds but which financially and materially worked a marvellous change in the island and after local examination was even commended by men like Dr. A. R. Wallace.

8. *The "culture" system.*—Governor Von den Bosch

(*a*) Granted cash credits and ten-year contracts to approved private individuals (usually Dutch) who would assist in developing the sugar industry.

(*b*) These credits were sufficient to enable them to erect mills and maintain themselves until the enterprise paid.

(*c*) The Government agreed that the peasantry should grow sufficient cane to supply the mills' capacity and deliver it at the mills at fixed rates.

(*d*) The ryots were obliged to plant up to one-fifth of the village land with cane and each man had to give one day's labour in seven to tend it.

(*e*) Natives who worked in the mills were paid regular wages.

(*f*) The mill-owner sold one-third of his finished product back to the Government at fixed rates and repaid one-tenth of the advance received. The rest he could export for his own profit.

Thus in Java in the thirties was laid the basis of the system under which small sugar factories have always flourished, viz.—

(1) Factories so located as not to interfere with each other's source of supply.
(2) An exceedingly cheap source of supply assured to each mill.

We read that in a few years "the whole east end of the island and the low hot lands along the coast were green at their season with the giant grass whose cultivation has so frequently forced or encouraged slavery in so many parts of the earth's tropical belt."

Slavery was abolished in Java in 1859 but by that time this system was well rooted and in many essentials still continues. Very great care had been taken in securing a very good class of colonist—"Education, cultivation and gentlemanly manners were essential." Absenteeism was not tolerated, and during the period of the ten-year contracts, leave of absence could only be obtained for actual sickness. The Dutch are deservedly famous as careful cultivators and Java is to this date like a garden for its cleanliness from weeds and order. "The jungle was cleared, fresh land was broken in and it is said that, during the half-century at which the system was at its height, the local population increased tenfold."

9. Such a system could not continue for ever, but it was not until 1890 that the Dutch Government entirely withdrew from all direct connexion with the many mills that the colonists had built in the island. Sixty years of such fostering care must bear results and this short historical summary is necessary to understand a condition of affairs which it is difficult to conceive could have arisen under a system of free contracts. Of course in this period the sugar industry passed through several vicissitudes. From the seventies till the end of the century, fostered by a system of bounties and helped by constant improvements in manufacture, beet sugar was steadily making the production of cane-sugar less and less profitable. In the early eighties, Java suffered from an attack of a disease of cane more terrible than any that has visited India. The Dutch Government was still directly interested in sugar and in the eighties they commenced to open experimental stations for introducing or evolving new varieties, for studying cultivation problems, etc. They also paid great attention to improved machinery. In Madras our first sugarcane station was opened at Samalkota in 1902 and the first sugarcane breeding station in India was opened at Coimbatore in 1913. Thus we are more than eighty years behind Java at any attempt at organization and more than thirty years behind them at attempts at research and enquiry. But to return to Java—the first result of the work on these stations was that when the bounty system broke down as a result of the action of Great Britain at the Brussels Convention of

1902 and when thereby cane-sugar was once more enabled to compete with beet sugar, the country which was in the best position to take advantage of this change was Java. The result at the present day is a feeling of amazement at the performances of Java.

10. *Present conditions in Java.*—There is an abundant supply of labour at As. 5 a day. So there is practically in India.

The land does *not* belong to the company. They rent it from the community. One and only one factory works in a group of villages. (This is controlled by the State.) The company can lease up to one-third of the cultivated land of the village. This is also under Statute. This ensures rotation of crops. The land being leased by the company ensures that the company controls the methods of cultivation and can regulate the daily supply of cane to the factory,—a most important point because, unless cane is crushed on the day it is cut, inversion causes change in the sucrose content. The rent paid to the cultivator (who has to pay the land-assessment to the Government) is Rs. 40 an acre for the sixteen months the land is under crop, i.e., the rent is only Rs. 30 a year. There appears to be no difficulty whatever in getting land at these rates. This is largely the inheritance from the old system and also the interest of the community is bound up in the factory which is the chief employer of labour. The net result is as follows: "The land is hired from year to year for one season only; but in practical fact the sugar company has a complete security of tenure without the outlay required for purchase. They have erected mills and laid out net-works of lines and roads to bring the cane from a distance of eight to ten miles without *owning an acre of plantation land.*" All the sugar tract is covered with these small factories working in their own areas in close co-operation and the cultivator cannot take his cane to a distant factory for competition prices. The land is leased and the cultivation is directly controlled by the company. No company can cut into another's preserve to rent land. This may be called exploitation and other hard names, but when superimposed upon it and working closely with it is a well developed and exceedingly well staffed chain of experimental stations for improving the yield per acre and also a staff of mycologists and entomologists backed up by a strict Internal Pest Act always ready to take remedial operative measures, also when all the companies are joined in the Seerabaya Sugar Syndicate which maintains a staff of chemists, I believe eighty, to analyse the products and check waste in manufacture, it is perfectly clear that there is in existence a very highly developed organisation in an exceptionally strong position.

11. It is worth while to compare these conditions with those in India. The first is land. An up-to-date sugar factory costs money to erect. It cannot afford to stand idle. It must therefore ensure its daily supply of cane. It cannot buy this from a distance and stock it because very shortly after the cane is cut the sugar content begins to decrease. If, as in India, it becomes so costly to arrange locally for sufficient cane, it has to buy from a distance. The only form in which it can buy and stock its raw product is in the form of jaggery. It is more expensive first to make jaggery, and then to refine it than it is to extract sugar direct from the juice. Now, Java factories can command some of the best cane land in the world at an annual rent of Rs. 30 an acre. If a sugar factory be erected in India what happens if it does not buy the land? The people in the neighbourhood know that the factory must lease the local land or incur the expense of transporting jaggery from a distance. The rates at once go up. The factory cannot remain idle without loss. Even without this stimulus to competition rates, where in Madras can sugarcane land be rented at Rs. 30 an acre a year? Dry land on which cane can be grown fetches Rs. 80 an acre and sugarcane land with an assured supply of water is often at Rs. 100, 120 and over. The next point is that it needs most careful attention and cultivation. I have quoted some of the heavy yields at Samalkota and Taliparamba. But these yields were not gained in a jump when a new variety of cane was started. They developed gradually as the land improved under steady constant care. It cannot always get this in this country of scattered holdings. I well remember expostulating with a man in Gōdāvari on the condition of his cane. His reply was unanswerable. He admitted it but at that time he was busy on his rice fields some fair distance away and both operations needed watching. I asked him the reason for his scattered holding and got the customary and expected answer "Partition." Unless a factory can be assured of its local supply it cannot pay to employ trained agriculturists to supervise cultivation, nor can it put down tram lines to bring the cane in or try other small economies which are of importance when thousands of tons of cane have to be handled. It is mainly this difficulty about land and supply which has led many countries to the conclusion that small sugar factories have no chance at all. In Egypt they talk of a capital of £250,000 as the minimum required. In Hawaii the capital of the chief company is 225½ lakhs of rupees. The Japanese acquired Formosa in 1894 and at once turned their attention to sugar. At first they failed because "the Chinese farmers who owned the land were unwilling to grow cane for the new mills or to sell the lands to the mills to produce cane for themselves." The Government endeavoured to compel sale, but in 1902, Japan went the whole length. "It established a sugar bureau in Formosa and in 1906 the Japanese Government issued regulations assigning a definite tract of country to each mill"; the farmers are bound to sell their cane to the mill and can be punished for making sugar themselves by the old primitive methods or for selling the cane to any one else†. "[illegible] for clearing land, erecting mills, irrigation, drainage, machinery, [illegible]

the sum of Rs. 50 lakhs a year but are now down to Rs. 10 lakhs. Formosa sugar was given free entry to Japan whilst the products of all other countries were taxed Rs. 80 a ton. Japan evidently is not the land of cheap sugar. The Government argue that by the more efficient methods thus ensured every one has profited, their critics state that it is a system under which "the mills take the profits and the farmers the losses." Certainly the mills have profited; but is it healthy? The Japanese Government can obviously "make or break the sugar companies by a stroke of the pen." The argument below these measures in Java and Formosa is "the cultivators are unable to put their land to the most profitable use while sugar companies with the skill and capital at their command are able to get a far larger return out of the land to the benefit of themselves, the cultivator and the community at large. The less efficient must be compelled to give way to the more efficient, and must not be allowed to block progress by their monopoly of the land." Is India prepared to accept this principle and to emulate Japan by following it out in stern practice? I imagine not.

12. In Mauritius also many of the factories acquired land when it was still cheap. But Mauritius often experiences great difficulties, and dividends are low. It appears to be able to keep its position owing to the excellent qualities of cane grown.

13. The net initial result is that Java and Formosa factories can buy their cane at prices per ton one-half or one-third of what it costs mills in Madras and they are sure of their supply. Added to that the mills do not work as independent units but jointly support a large staff of experts and chemists. Trained chemists are needed in sugar factories. Trained chemists are at the head of Messrs. Parry's works both at Nellikuppam and Kulasekarapatnam.

14. The two bed rock needs are therefore—

(*a*) cheaper production,

(*b*) organization under strict control.

Our first need is to breed better canes and establish them. Yields comparable with the averages in Java have been reached on our agricultural stations and maintained. I am confident that by careful breeding, etc., still better canes can be evolved. But it must be remembered that Java is not stationary in this. "The Director of the Experimental station at Pekalongan confidently looks forward to an average production of as much as seven tons of sugar per acre in the future. In a favourable year one mill has actually reached that for one month's working." We need a variety of cane yielding 50 tons an acre.

15. As for organization I do not see at present a way through it. Given a good bearing variety of cane, surety of supply, good machinery and intelligent business control, small factories will pay independently of all abkāri contracts. But the first condition has still to be gained and second and fourth present great difficulties. Mr. Keatinge gives up the problem entirely as hopeless so far as Bombay is concerned and is inclined to concentrate on jaggery for which there is undoubtedly a big demand and which he considers more suited for small scattered unorganized cultivators. The problem at present is far beyond the grasp of co-operation in India tempting as such solution is. But if the first step can be gained, viz., a vastly improved cane— the openings for successful organization may improve.

As it is, there are in Madras many places to be seen where small sugar factories have been started and abandoned in Coimbatore, Gōdāvari, Vizagapatam, Tinnevelly, parts of South Arcot. The difficulties of ensuring a cheap and sure supply of cane—often, it must be admitted, accentuated by indifferent business management—have almost invariably proved insuperable. Nellikuppam continues and expands. But for some time it, I believe, worked for the abkāri contract. Yet Nellikuppam can now manage sugar. But it has several exceptional conditions in its favour such as—

(1) It has been long established.

(2) Whilst Mr. Neilson, who is a trained chemist, has been in control it has gained enormously in the favour of the ryots.

(3) It is not situated in an ideal sugarcane tract but what is more important, it is not situated in an ideal paddy tract or where paddy is necessarily in very high demand. The Tanjore delta is too close.

(4) The whole tract has a sure and excellent supply of subterranean water.

(5) Mr. Neilson has assisted the ryots in sinking wells and establishing oil-engines. It is also he who introduced amongst them red Mauritius canes and better varieties.

(6) He has now leased land (but very scattered) and is using steam tackle for cultivation and besides maintaining some certain supply is testing all our improved canes on field and commercial conditions.

Backed by legislation against disease, etc., it is by intelligent trained joint action under strict Government control and *protection* that Java has built up its position of pre-eminence in this industry (vide paragraph 4 supra).

16. I have never had the fortune— much as I should like it— to see conditions in Java and Formosa and have for this report drawn largely on Geerligs "The World's Sugarcane Industry," on Mr. Keatinge's recent report, and on Histories of Java.

Resolution—Mis. No. 3984, *dated* 15th *December* 1914.

The reports of the Directors of Industries and Agriculture on the conditions of the sugar factories in the Madras Presidency and on the question why indigenous sugar has not been successful in competing with foreign imported sugar are submitted to Government with reference to their Memorandum No. 2931-C/13–1, Revenue, dated 22nd November 1913. Mr. Chadwick's interesting report furnishes a full answer to the question which was asked by the Hon'ble Rao Bahadur P. C. Somasundaram Chettiyar Avargal at the meeting of the Legislative Council held on the 11th November 1913 and which was referred to the Board for report in the memorandum quoted above.

(True extract)

T. RAGHAVIAH,
Secretary.

ORAL EVIDENCE, 7TH FEBRUARY 1917.

Sir F. H. Stewart.—*Q.* You are Director of Agriculture in this Presidency?—*A.* I am now acting as Director of Agriculture.

Q. Have you acted before?—*A.* I have acted for a year in 1911-12.

Q. Have you had any previous experience or training in agriculture?—*A.* No. I have been a Settlement Officer. I have taken a Science Degree.

Q. For how long are you holding this post?—*A.* No definite period has been fixed.

Mr. C. E. Low.—*Q.* You say on the first page of your note that it is impossible to control the adulteration and mixing which may take place at a number of small ginneries. Have you any idea in your mind as to how this control should be worked out?—*A.* It would need a very large staff of inspectors to prevent mixing of varieties of cotton at the gins.

Q. Suppose the gins were required to take out a license and that breach of the conditions involved the cancellation of the license, do you think that this would ensure purity?—*A.* Yes.

Q. The gins are themselves the buyers in many cases?—*A.* That varies in the different places.

Q. In some places they do it for custom?—*A.* In Tinnevelly most of the gins are controlled by the buying firms. The buying firms themselves run the gins.

Q. What about the prices? Who fixes them?—*A.* They have their own prices. There are no outside buying firms in the Tinnevelly tract.

Q. What cotton do the gins get? From what sources? Is the cotton delivered by the ryot or do they gin on custom?—*A.* In the Northern tracts they merely gin on hire. In Tinnevelly they are under the control of buying firms.

Q. Supposing that a ryot or a middleman turns up with a mixed sample?—*A.* It ought to be a condition of any control that such samples if they are found to be mixed, would be refused by the gins.

Q. Who would exercise that control?—*A.* I cannot say who can actually control. I am mentioning that as a possible way of meeting the situation.

Q. Supposing that were not possible, can you suggest any other line of defence?—*A.* *Witness here gave confidential evidence.*

Q. Are you supplying seed to these people?—*A.* We are doing a large amount of work in the Tinnevelly tract in the matter of supplying seed to the ryots.

Q. Do you make it a condition of the supply that they should not mix this with other kinds of cotton?—*A.* Not specially, but in Tinnevelly they have found our seed to be very profitable both in the matter of yield and also in fetching good prices.

Q. Apart from this pulichai which is used to adulterate, you mention the Cambodia cotton. Is it as profitable to grow pulichai as this?—*A.* It all depends upon the price. In a year like this when very high prices have been paid, it is quite possible to grow pulichai profitably. When the prices fall off, or the demand for cotton falls off, the short staple cotton is the first to feel the effect.

Q. Which do you think would pay better?—*A.* I think the long staple. It is difficult to say without working out the figures. The price of Bengals is below that of Tinnevelly.

Q. Turning again to this question of adulteration, supposing you do not go so far as to refuse, would it do if only certain local gins were allowed to accept the samples?—*A.* As far as Tinnevelly is concerned I am certainly in favour of absolute refusal. There are certain firms which have agreed to it.

Q. The firms have agreed to it but what about the ryot?—*A.* The ryot certainly dislikes it.

Q. Before pulling up the plant in the field, do you think that the license might contain some conditions about the supply of seed?—*A.* We have not worked out the idea. We are trying to control the supply of seed as far as possible in Tinnevelly.

Q. Do the ryots purchase the seeds very largely?—*A.* Yes.

Q. How are the conditions in Cocanada, Coimbatore and the Ceded districts?—*A.* We have not dealt with Cocanada. In the Ceded districts the gins are worked for hire and any system of co-operation has to be financed.

Q. Would this system of licensing gins extend to the sale of the seed? If so, how are you to tackle the difficulty when a man wants to sell it for cattle food or to an oil mill?—*A.* We could not interfere with it.

Q. If the ryot said that he bought it for an oil mill, how are you going to tackle that difficulty?—*A.* The point is that we must educate the ryot.

Q. That should be done because the ryots would make any system nugatory?—*A.* They would.

Q. You could have a system of license under which the man would have to certify that it is pure within a reasonable limit?—*A.* Most of the gins do not buy the seed at all.

Q. The same precaution that would apply to the refusal of the mixed samples would also apply to the original ryot who mixed the samples?—*A.* It would to a certain extent.

Q. Do you think that inspection of this sort should be done by the Agricultural Department?—*A.* We have not got anything like the men for it. It would be a sound thing if the Inspectors were trained in the Agricultural Department.

Q. And they would be under the orders of the Agricultural Department?—*A.* I think so but it would be a very big thing to take up. A good deal will have to be done by private agency and commercial men.

Q. You mean the association of the trade?—*A.* Yes. That would be one way.

Q. In the meantime do you think that the Agricultural Department in this and several other provinces will find it necessary to rely on departmental action of a more or less extensive character?—*A.* Yes.

Q. Do you think that that is bound to last for some years?—*A.* I think so. But we are trying to get co-operation from the ryots and get most of the work done by the ryots themselves.

Q. What kind of man would you want?—*A.* I think he must have plenty of technical knowledge in order to gain the confidence of the ryots. The first thing that the ryot does is to cross-question the officer. If he finds that the officer is no good, then he has no trust in him.

Q. Don't you think that specially selected officers of the Agricultural Department and also the Revenue Department could be given some training on the farm itself?—*A.* I have never thought of it. I must think over it. I cannot give an opinion offhand.

Q. How far have you gone in the matter of co-operation of ryots in the matter of supplying seed?—*A.* It has been successful in Tinnevelly. I think last year we got 87 villages in which a certain number of ryots co-operated to form seed unions.

Q. Are these registered under the Co-operative Societies Act?—*A.* No.

Q. Have you any idea of making it so?—*A.* We have that idea. They usually run parallel.

Q. Do you find it difficult to start any organisation on the co-operative basis unless the people are inoculated with the co-operative microbe?—*A.* There is some difficulty, for example in Bellary.

Q. How long do you think it will take for the ryot to realise his responsibility and market pure samples of cotton?—*A.* That is very difficult to say. We always help to put up improved cotton. You practically want every village to come in. I cannot say how long that will take.

Q. You will have to depend on departmental action for a long time?—*A.* Yes.

Q. What have the trade to say about the control of gins?—*A.* I have discussed it informally with the Tinnevelly cotton firms last September. They were in favour of having power to uproot the plant in the field. I think they were prepared to accept the control of gins provided the other thing was also enforced. They do not want any control of baling or anything of that sort.

Dr. E. Hopkinson.—*Q.* You said that the Department of Agriculture are supplying seed in some cases? How is that done? Do you buy the seed?—*A.* We grow it. The first thing we do is to grow selected plots on our own farm down in that tract (Tinnevelly). These are multiplied.

Q. Are you speaking of Tinnevelly only?—*A.* We had the same thing in Bellary and Kurnool. The thing has gone farthest in Tinnevelly. These plots are multiplied until there is enough seed on the farm and then it is given out to what we call seed farms on contract. The ryots grow it. They sell us back the whole of the seed and then at the next stage we get the ryots to form seed unions. Certain number of ryots club together and it works in rotation. In the first year one of their number will grow one twentieth of the total area which they own with the seed which we give them and which has been grown on the seed farm and that cotton is specially ginned and the seed in the next year is enough to sow the whole of their area.

Q. What is the proportion of the whole area?—*A.* About 20 times. Each year we give them fresh seed from our farm and they are under agreement. The members of the seed unions will supply the seed as far as possible. This seed is subsequently used for sowing and not for cattle food. It sells at a premium.

Q. Do they buy the seeds from you—the seeds that they are going to put down on one-twentieth of their land?—*A.* That is purchased.

Q. You in turn purchase the seed grown therefrom?—*A.* The ryots keep it. They run the thing themselves.

Q. Is there any difficulty in finding the money for the purchase?—*A.* Very little money is required. The system varies. The actual terms of the agreement varies in different places. We give the seed and take back a corresponding quantity at the time of harvest. Formerly we used to pay the assessment on the land as an inducement. That is not necessary now. Now they realise the extra profit they derive and they are only too glad to get the seed.

Mr. C. E. Low.—*Q.* Is there a big premium?—*A.* I have not got the figure I think it is considerable as compared with the bazaar seed.

Dr. E. Hopkinson.—*Q.* In what direction have the efforts of your department been directed with a view to the improvement of cotton. Has it been in improving the yield or improving the quality?—*A.* There are three things, the actual yield, the ginning percentage and the staple, i.e., the length and strength and colour of the staple. In Tinnevelly we have been successful in securing all three. In Bellary we find that the difficulty is about the poor yield. We have had great difficulty there in getting a staple cotton which will give as much yield as the country cotton. That is what has held us back.

Q. Has the improvement been due to research and experimental work at the Agricultural College or has it been due to demonstration methods that you have been describing in connection with gins?—*A.* It is both. It would never have been possible without research. Most of the research on cotton was done by the Deputy Directors. It was done on the out farms. We never had a cotton specialist. A certain amount of work was done by Dr. Barber.

Q. The research was done by the Deputy Directors in farms?—*A.* Yes.

Q. And also the arrangements made with regard to pure ginning, which also had a great effect?—*A.* Yes.

Q. Supposing that the Department of Agriculture, as also of the Director of Industries were fully equipped in regard to staff, do you consider that a subject like ginning would more properly come under the Department of Agriculture or under the Department of the Director of Industries?—*A.* That is a difficult question. We have had much discussion at present as to whether the semi-agricultural and semi-industrial matters like the gins and rice hullers and so forth should be taken up by me or the Director of Industries. We have it under discussion now.

Sir F. H. Stewart.—*Q.* Is it that both want it or neither wants it?—*A.* We will both be glad to do the thing provided the time and the staff is given.

Dr. E. Hopkinson.—*Q.* Take the particular question of gins. Have you considered whether it comes more appropriately under the Director of Industries?—*A.* I should think that it more appropriately comes under the Director of Industries provided he works with the Agricultural Department. In the past there was some dispute about that. For instance I know that in Tinnevelly my predecessor objected to the then Director of Industries putting up these small gins.

Q. Could you go further and say that all questions of marketting ought to come under the Director of Industries?—*A.* I suppose that ought to be. We are also vitally interested in the question of cotton marketting.

Q. Do you mean to say that ginning comes under marketting?—*A.* Yes.

Q. In the Madras Presidency is there any cotton which is properly known as long staple cotton?—*A.* They have got it in Tinnevelly. The Tinnevelly cotton is used in Lancashire. Practically all is exported to Lancashire.

Q. It goes to Japan also?—*A.* Especially nowadays. It has been going to Japan.

Q. What length of staple is it?—*A.* About one inch.

Q. You say that long staple cotton is exported to Lancashire and to Japan. I have always understood that the Madras mills and the Bombay mills and the Indian mills generally are ready to absorb all the long staple cotton that India is producing and regard with jealousy the sending of long staple cotton out of the country?—*A.* They do not absorb all the Tinnevelly cotton. They have used it and they seem to welcome it.

Q. Do you mean to say that there is a considerable margin left for export?—*A.* Yes.

Q. Do you know whether there is a tendency for the Indian mills in the Madras Presidency to increase the consumption of long staple cotton?—*A.* I think so. It depends on whether the extra price will compensate and make it worth while to take up the thing. It is cheaper to spin with, than short staple cotton. Tinnevelly cotton has always commanded a higher price than the short staple cotton.

Q. Do the Madras mills import American cotton?—*A.* Occasionally.

Q. Is all the cotton required usually obtained locally?—*A.* I do not know. I would not be certain. I know they occasionally import American cotton.

Sir D. J. Tata.—*Q*. With reference to the export of cotton, some of it goes to Japan and to the United Kingdom? Does it not depend upon the fact that the mills in southern India are not able to consume the whole quantity and that what is left has to be exported. Is the demand for long staple cotton by the mills in southern India adequate to the supply?—*A*. I could not answer that offhand.

Q. There is a good deal of fine spinning on the Bombay side. We import some Tinnevelly cotton there. The mills in the Central Provinces have very fine cotton which serves their purpose very well. As long as they can get it there, they do not care to come down south for it. Therefore if the cotton in the south cannot be absorbed by the local mills it will have to be exported. Are the mills here capable of absorbing all the cotton produced locally?—*A*. I could not answer that offhand. I think it is mostly a question of what will pay the men most. If the mills here can pay the same price, then they would sell it locally.

Q. Is it not a fact that the ryot grows the cotton that pays him most on the yield? Can you tell us how the short staple cotton was introduced here?—*A*. I do not know how the short staple was introduced.

Q. Was it introduced simply for mixing?—*A*. Mr. Chadwick worked out the figures and he found the short staple cotton was not so profitable as the long staple.

Q. Then why does the ryot grow it?—*A*. He manages to get the price of long staple Tinnevelly cotton after mixing.

Q. Is there not a demand for the short staple cotton by itself?—*A*. Certainly.

Q. Can you tell us how it stands with reference to oil yielding qualities of the seed?—*A*. I do not know about that. We have never touched the oil pressing problem down here.

Sir F. H. Stewart.—*Q*. It has been pointed out that Cambodia cotton is deteriorating in quality and that hitherto no organised attempt has been made to improve the quality. Have you any remarks to offer on that subject?—*A*. It is simply due to lack of staff. We have not got the staff to do it in the districts.

Q. And nothing has been done?—*A*. Nothing has been done in Coimbatore.

Q. Do your remarks refer principally to Tinnevelly?—*A*. We have also been working in the Northern and Western tracts. Practically nothing has been done except in these two tracts.

Mr. C. E. Low.—*Q*. Have you any views on the subject of the supervision of markets? Do you think that the present position is satisfactory in this Presidency from the ryots' point of view?—*A*. I have been recently looking into the question of cotton marketing and I think that there would be a greater improvement if the ryot and the actual buyer were brought into closer contact.

Q. You probably know what is done in Berar as regards marketing. The buyer buys practically from the individual ryot directly. The areas under cotton in Berar are much larger and larger lots can be marketed at a time. It was put forward to us by a witness here that the ryot here brought cotton in such small quantities that it would not be a practicable proposition to buy direct from many individual ryots?—*A*. That is what I was told by the firms.

Q. In Berar the ryots who grow the cotton in such large quantities themselves sell direct and the middleman is eliminated. Don't you think that a system like that would be useful?—*A*. We have not that kind of thing in Madras.

Q. Have you considered the marketing question for any other crop except cotton?—*A*. I have gone into indigo.

Q. Oil seeds?—*A*. I have not gone into that particularly.

Q. Paddy?—*A*. No.

Q. What sort of market is there for paddy? Is there any place where the exporter can buy direct from the ryot?—*A*. That is a very wide question. The practice varies very much in the different places. There is a lot of business done in the weekly markets and large quantities of paddy are brought to these markets. Much depends on whether the ryot is solvent or not. In many places the middleman collects and brings it down to the market.

Q. That seems to be the case everywhere and that cannot be remedied by the market. If the ryot is solvent, he brings it to the market himself? Is it not the case?—*A*. I have not really investigated this point.

Q. The ryots bring the paddy themselves in their own carts?—*A*. I have never looked into the question and cannot give an opinion offhand.

Q. You get a place with a regular enclosure where the things are sold subject to the control of some authority?—*A*. I know that many of these weekly markets are controlled by the District Boards in towns and in the big villages. I do not know how much trade they do and what sort of things are sold. I think it must be very considerable.

Q. Don't you think it would be a good thing if these markets were kept under control by the State authority?—*A*. Yes. I think that would be a good thing to do. The ryot [illegible] be brought into contact with the larger buyer.

Q. The Commissioner of Berar recently prepared a note on the subject of the Berar markets. The system has been extended into Khandesh and the thing seems to be very popular?—*A.* One of our Deputy Directors Mr. Hilson actually proposed the starting of some such system. I sent his note round to the cotton firms, and they did not think very much of it. We have no authority for forming a market like that.

Q. Do you think that such a system would be of real help at a later stage?—*A.* Certainly.

Q. As regards oil crushing, you say that the demand for cake is increasing in Madras? Has the price gone up?—*A.* You mean in the Gōdāvari valley particularly. That was my information. I gather that the increase of crushing of castor in the last year has led to a considerable increase in the use of castor cake for sugarcane. I have not got the precise figures.

Q. Is that due to the operations of your department?—*A.* I think so. I have got no figures about the price. I noticed in the statistics of export that the amount of castor oil exported from these parts has gone up.

Q. Is there a demand on the part of the ryots for feeding the cattle?—*A.* They do not use it to a very large extent for that.

Q. Have the Industrial Department touched the subject?—*A.* I could not say.

Q. Could the Agricultural Department or the Industrial Department do anything to popularise the use of this?—*A.* For milch cattle?

Q. Generally whichever is useful?—*A.* It is a question of price, whether it would be advantageous to the ryot.

Q. Are you in a position to say what degree of success would attend?—*A.* It depends very much on the prices. At present they use cotton seed and gram. It is a question of whether it will be worth while for the ryot to take the cake.

Q. Many complaints have been received on this subject of adulteration and the injury done to export trade by adulteration. It has been suggested that a system of optional certificates would help very much. Have you any views on the matter?—*A.* It is a very difficult subject. I have recently looked into the subject of indigo. It is practically impossible to sample the Madras indigo in its present form.

Q. Do you think you could sample ground nuts?—*A.* It is extremely difficult to sample it.

Q. About paddy?—*A.* It is practically not exported at all.

Q. What are the articles of export for which a system of optional certificates might be applied? Which are the articles most in need of some such system?—*A.* It is difficult to say. The question of drug plants came up some time ago. I thought that it might be possible to start with this because you have small quantities to deal with and you can concentrate. They might be examined and certificates granted. Indigo is another. I have been looking into the subject now. We may make definite proposals about it.

Q. What about ground nut?—*A.* The whole trade is too bulky. Something like 2 hundred thousand tons are exported and they are exported mostly in bulk. It is obviously a very big thing.

Sir F. H. Stewart.—*Q.* With reference to this question of certificates, what would be your opinion? Would you have them compulsory or would you make them optional?—*A.* We might start from the optional point of view as an experiment.

Q. At what stage would they come in?—*A.* I should say that the time of export would be easy to control.

Q. Does your department do anything specific in the matter of popularising artificial manures?—*A.* Yes.

Q. By demonstration?—*A.* Yes.

Q. With regard to the various manures, do you take any steps to analyse these to find out what their purity is?—*A.* Some commercial fertilisers are sold without any guaranteed composition, and we discourage the ryot altogether from using them. We tell the ryot what to take, such as superphosphate.

Q. Do you think that it would be a good thing if any one who wished to sell these commercial fertilisers were obliged to have an analysis made of them and to supply a copy when selling?—*A.* That would be an excellent thing.

Hon'ble Sir R. N. Mookerjee.—*Q.* You say speaking about oil seeds that there has been a considerable increase in crushing castor, and that Government should encourage the use of decorticators. Have you ever reported to Government or made any proposal to Government?—*A.* No.

Q. Supposing that this Commission were not appointed, then this matter would not have been represented at all?—*A.* We have an Agricultural Engineer who is looking into the subject. The whole thing has been held up owing to the war. We had some experiments and they were not satisfactory and the matter is still under investigation.

Q. In your note you say that it may be feasible to increase the yield of dye very largely by the scientific control of the bacterial cultures which are responsible for the fermentation and that you think that Government might possibly try an experimental indigo factory in Madras? Have you also in this matter made any representation to Government?—*A.* Proposals are now before Government. Mr. Davis, the Indigo Expert, has, since writing the note, visited Madras and definite proposals have been formulated.

Mr. A. Chatterton.—*Q.* Can you tell me whether there is any increase in the number of country mills used in expressing oil?—*A.* I could not say at all. The export of oil is increasing.

Sir F. H. Stewart.—*Q.* Where does the oil go to?—*A.* It largely goes to Calcutta there to be mixed with ghee and things of that sort.

Q. In regard to this question of issuing certificates, you would stop there and not exercise any other control?—*A.* If the certificates were issued the public would learn to ask for them.

Q. In the case of ground nuts what action would you propose?—*A.* I have never thought of that at all.

Q. In the majority of cases the issuing of certificates would involve a chemical analysis to determine the percentage of the essential ingredients?—A. Yes. I have not considered the question of ground nuts. It might be possible to analyse oils, indigo and drug plants.

Q. Do you think it would be of any value to issue these certificates?—*A.* I very much doubt it.

Q. You deal with the question of agricultural implements and machinery. Has any attempt been made to arrange with the local engineering firms for the supply of these implements?—*A.* Yes. We have corresponded with various firms, tried their ploughs and given our opinions on them.

Q. Have you put up any depôts at which the ryots can purchase these implements?—*A.* They can buy them from the firms.

Q. Do you purchase these ploughs wholesale in England or America and put them down here for sale?—*A.* We work with a firm and sell for them, acting as their agents.

Q. As Agents for one particular firm?—*A.* For one particular make of plough which we recommend.

Q. Have you sold these ploughs on any system of hire purchase?—*A.* The cost of these ploughs varies from 15 to 16 rupees. The sum is small and it is not necessary.

Q. Then as regards manures, do you sell them outright or on easy terms?—*A.* For manures we do not keep any depôts. We generally put the ryot in touch with the firm. That is the usual way we do it.

Q. Are there any co-operative societies working among the ryots for the purchase of manures?—*A.* There are two or three agricultural co-operative societies.

Q. Are they doing it under the supervision of the department?—*A.* Yes, with the advice and assistance of the department. We have got no immediate control over them.

Q. With regard to the question of oil-engines and pumps, has that been taken over by the Department of Agriculture? Have you got any staff of subordinates similar to that which exists in the Department of Industries?—*A.* The staff that was working with the Department of Industries has been taken over bodily.

Q. Do you grant takkavi loans yourself?—*A.* I grant up to Rs. 3,000 myself.

Q. Have you got any special officer attached to the department to deal with these loans?—*A.* I have got a special Tahsildar to enquire into the revenue side as regards security and so on.

Q. He collects the instalments?—*A.* I do.

Q. Have you got any definite period for which the loans are granted?—*A.* Five years.

Q. Have you got any system of selling on the hire purchase system?—*A.* No. There are plenty of firms who will do that.

Mr. C. E. Low.—*Q.* I understand that sulphate of ammonia is likely to prove a valuable manure?—*A.* It has not been thoroughly proved yet.

Q. Supposing you got a good supply of sulphate of ammonia produced in this country and at the same time if you have got a foreign demand for export you might easily reach a stage when the ryot will not be prepared to pay the price?—*A.* That is a difficult question to answer. It depends on the land and the return that the ryot can get out of it. The cheaper it is, the wider it will be used.

Q. Are they using it at present?—*A.* They are using it at present on paddy land.

Mr. A. Chatterton.—*Q.* With reference to the jaggery plants, you say that there are two plants which are being worked experimentally by Government. Have you also taken over the control of the pumping and boring department?—*A.* Yes.

Q. Do you propose to develop that system?—*A*. I am still trying to get information about that. I inspected one that is working here and I have been able to get very little information about it, whether it was a success or whether it was a failure. I am investigating the whole question as to whether it will be worth while taking it up or not.

Q. From your remarks here you come to the general conclusion that there is very little prospect of developing the manufacture of sugar in the Madras Presidency owing to the scattered areas?—*A*. The ryots are independent and can grow what they like.

Q. If sugarcane were grown under satisfactory conditions as regards manuring and methods of cultivation, do you think they would grow more sugarcane?—*A*. I think so. If sugarcane is grown on land irrigated from wells on high level lands, it would be much better.

Q. Do you think that the competition of paddy would affect it?—*A*. That depends on the relative prices of paddy and sugarcane.

Q. We have had evidence in various places that the ryot can make Rs. 200 to Rs. 300 per acre. What are the real difficulties that the ryot has to face in the matter of sugarcane? Why is it that he does not grow it? In Coimbatore there are many ryots who have a certain amount of their land under sugarcane and they get large profit from it. They do not care to plant a very large area. They might if they want to? What is it due to? Is it want of capital?—*A*. Partly that. They have to get it all crushed at a certain time. It requires capital and also heavy manuring.

Q. Is that the most important item?—*A*. The difficulty of crushing. I think that is the reason why it is not grown universally.

Q. Is it due to precariousness of water supply?—*A*. It is not precarious if you can get water all the year round.

Q. Have any steps been taken by the Department of Agriculture either by itself or if conjunction with the Department of Industries to bring about a considerable development of sugarcane cultivation?—*A*. I do not know of any attempt.

Dr. E. Hopkinson.—*Q*. What are the relations of the Director of Agriculture in the Madras Presidency to the College here in Coimbatore? Are there any official relations?—*A*. I am in general control of the department which includes the College. The College is part of the Agricultural Department and I am in general control of the whole department. In regard to correspondence I deal directly with Government.

Q. It goes through you?—*A*. Yes. I deal directly with Government and deal with the financing of the Department and the general control of it.

Q. The Principal of the College reports through you?—*A*. Yes.

Q. How far are you consulted about any problems of research which are taken up and worked out in the College?—*A*. I do not quite follow that.

Q. Supposing that you as a Director of Agriculture in Madras considered that some particular matter ought to be investigated?—*A*. I should discuss it with the particular expert and if necessary with Government.

Q. You deal with the particular expert and not with the Principal of the College?—*A*. No. With the particular expert and with several of them, if necessary, whether a particular line should be taken up or not. The final decision will be with me.

Q. The Principal of the College as such is responsible merely for the routine work of the college especially the teaching?—*A*. Yes. He also runs the farm attached to the College.

Q. And the research work does not come under him?—*A*. Not at all.

Q. Are there any experts engaged in research work who are also engaged in teaching?—*A*. Yes.

Q. They all deliver lectures?—*A*. A certain number, yes.

Q. In your opinion is there any clash between the claims of research and of teaching work?—*A*. Yes. It is a question of the number of experts we can employ. The history of that question dates back some time. When the college started there were several objections by some of the experts who understood that they would not be required to do any teaching work at all and then the Government of those days decided that they must teach. But in practice the teaching is mostly done by the Indian assistants to the experts. Although the experts do only a limited amount of teaching they are generally responsible for the teaching. It is a question of the amount of work there is to be done and the number of experts whom we can employ. Both teaching and research are important. There are some matters in which it will be better to have a whole time research man to do research and nothing else. But on the other hand a teacher who does not do any research work is generally not so satisfactory a teacher, as a man who is doing such work, especially for the higher teaching. Much of the teaching at Coimbatore is very elementary and that can be easily done by a man who is not doing any research work.

Q. Apart from the question of the cost of the staff, you would still be prepared to say that the experts should take some portion of the teaching work?—*A.* I should prefer to see that the man who is doing the higher teaching work is a man who does research. At the same time I would not like to divorce teaching from research especially higher teaching.

Q. Do you mean to say that research work should be the chief duty and that teaching would be subsidiary?—*A.* That is putting it rather too strongly.

Q. We should like to have your exact views on this point?—*A.* Where necessary I should have separate research workers on important problems. At the same time the teaching staff must also do some research work, I mean the senior members of the teaching staff. That is my general opinion.

Q. Because they will be better teachers?—*A.* Yes. In order not to hamper research, I should like plenty of research workers who would be doing nothing else.

Q. Do you anticipate that the Indian students here may make such progress in their studies that they can look forward to taking up responsible work hereafter?—*A.* Yes. There are a few examples of men who are coming on.

Q. Do you look forward in the near future to Indian mycologists and Indian chemists being appointed either in this Presidency or elsewhere? Do you think it is a long way off?—*A.* That is a long way off. It will be possible to find a few in the immediate future.

Q. There is no bar at present to a competent Indian who might fill up the vacancy?—*A.* There is no bar at all.

Hon'ble Sir R. N. Mookerjee.—*Q.* How can you expect Indians to come in if they are placed on a different footing?—*A.* There is nothing to prevent an Indian being put in the same status. There was a proposal to employ another mycologist in Madras. Enquiries were made to find out whether one was available locally. No one was of course found.

Q. Would you put him on the same grade as the men from England?—*A.* Yes. If he was sufficiently qualified.

Q. Is there any rule that the appointment must be made by the Secretary of State? —*A.* But there is no reason why an Indian should not be appointed.

Q. I have made certain enquiries and my information is that if an Indian is appointed in this country he does not obtain the same status or the same rate of salary as an English man appointed in England?—*A.* There is an young man who has obtained a degree of agriculture in Edinburgh. He is now in this country and he might possibly be appointed as a Deputy Director of Agriculture. The matter is under consideration. There is one man now here. He is on probation as a Deputy Director of Agriculture.

Q. Is he getting the same allowances?—*A.* He gets less pay. The rank is the same. He gets two-thirds of the pay of the appointment.

Dr. E. Hopkinson.—*Q.* Two courses are open in the matter of appointment of chemists. I take chemists as an example. The chemist in the Agricultural Department of the province might take up an appointment there with an idea of spending some time in India in that particular work. In that way he becomes an expert in the particular problems which are connected with the provinces and no doubt his value to the provinces increases year by year. At the same time he loses touch to a great extent with outside work. He may become stale. On the other hand if such an appointment were distinctly made for a limited term and it became a rule that he may be moved from one province to another, do you think that it would be advantageous to do so?—*A.* If he is a good man I should prefer to keep him in the same place and give him plenty of salary if you are satisfied with him.

Q. Take the case of a good man. Do you think that the question of pay is sufficient to satisfy him. He must live to a large extent a life of intellectual isolation and social isolation too, at any rate scientific isolation. Would that not be regarded as a great drawback for which in many cases the pay would not compensate?—*A.* It is difficult to say. I have not formed an opinion at all. What period would you keep a man in a place?

Q. Seven years?—*A.* It takes a good many years for a man who comes out here to learn something about this country and to start useful work. It takes him at least five years. If he is moved after seven years it means that the province will not have from him more than two years useful work.

Q. Supposing a man came out here after seven years in the United Provinces, it would surely be very much easier for him to obtain information pertaining to the Madras Presidency?—*A.* It would be to a certain extent. Our conditions are very different from those in Northern India. I would keep a man the whole of his service in one place and make the conditions attractive. He should have plenty of leave to enable him to meet his fellow-scientists in the course of the year. He might get study leave

Q. I was about to ask you as to study leave. You advocate it?—*A*. I am in favour of it.

Q. Study leave for a particular definite object or general?—*A*. I would like to leave it rather general.

Q. I have spoken of the chemist merely as an example. What you have said would apply to the mycologist?—*A*. But the mycologist deals even more with local matters, such as the diseases of local crops and local insects.

Q. Have you had occasion here in the Madras Presidency to bring out an expert from home to deal with any particular matter—to deal with any special problem?—*A*. Not in the Agricultural Department. Do you mean for a limited time?

Q. Yes.—*A*. I do not think we have any on the agricultural side.

Q. But assuming that such a problem arises, would you advise the Government of Madras to apply home and ask for some one to be sent or would you refer the matter to Pusa?—*A*. It all depends on the problem. We could get any help we can from Pusa. But we are independent of Pusa.

Q. Failing that you will recommend to the Government of Madras to bring out an expert?—*A*. It all depends on the nature of the problem. A matter like that would need the sanction of the Government of India. They will probably consult the Agricultural Adviser at Pusa. We could not act independently in a matter like that.

Q. What are your relations as Director of Agriculture in Madras to the Institute at Pusa? Have you any special relations?—*A*. Not administrative.

Q. Do you attend any of their meetings?—*A*. We attend their Board meetings once in every two years and occasionally special meetings. Their experts are supposed to tour all over India. We have just had Mr. Davis, the Indigo Expert and Mr. MacKenna, the Agricultural Adviser, has also been on tour round Madras.

Q. Did Mr. Davis come at your invitation?—*A*. He came more or less at my invitation. I wrote to the Agricultural Adviser asking what was being done about indigo. He suggested that Mr. Davis could come down here and discuss it with us.

Q. It is his duty to give you all the information he can and your duty to obtain as much information as possible from him?—*A*. Yes.

(At this point the Commission adjourned and resumed after an interval.)

Dr. E. Hopkinson.—*Q*. You told us before we adjourned, in reference to indigo matters, that Mr. MacKenna had also been here. Did Mr. MacKenna come on an ordinary round of inspection?—*A*. Yes.

Q. Are they rounds of inspection, or was it simply a visit for his own information?—*A*. It is both. He is supposed to keep in touch with Provincial Agricultural Departments.

Q. He does not report to the Government of India as to the efficiency of the Colleges in the Madras Presidency?—*A*. I think he makes reports, but exactly on what point I don't know, as I have never seen them. He will make a report of this tour; he was writing it at the time.

Q. When he comes, you confer with him on any matters of interest?—*A*. Yes.

Q. And I suppose he also informs you of any matters of interest?—*A*. Yes, and we discuss various questions.

Q. In regard to another point in connection with the relation of the Agricultural College here and the institution at Pusa, what happens to the results of any research carried on here, as regards publication?—*A*. They are published in Memoirs issued at Pusa. They have to be passed by a Committee. After that they are published as Memoirs or in the Indian Agricultural Journal issued at Pusa.

Q. Do you remember any occasion when any of the research officers here felt that their research work was not properly received and failed to be published in due course?—*A*. *Witness here gave confidential evidence.*

Q. You have no independent means of publication at all; you don't issue a journal?—*A*. We are just issuing more or less departmental information, a sort of Year Book of the Madras Agricultural Department. We wish to put in short notes on unfinished work, otherwise they merely get into the Government files in an office and can never be found again. Of course we publish bulletins and leaflets of the Agricultural Department but that is only for propaganda work among ryots.

Q. Is that done on a considerable scale?—*A*. Yes, the leaflets are mostly issued in the vernacular, and we publish popular agricultural calendars every year with popular articles on improvements in agriculture.

Sir D. J. Tata.—*Q*. Are these verancular publications made much use of; do they serve any purpose?—*A*. They serve a certain amount. They don't get to the right people, I am afraid. The real agriculturist does not read them. He does not read much. They are read by a certain number of people.

Dr. E. Hopkinson.—*Q*. What means have your research officers of becoming acquainted with what is going on in the way of research in other provinces?—*A*. They can read the publications and then there are the Board Meetings at Pusa where many things are discussed, and certain officers meet each other. We exchange officers for examination purposes at different colleges, and occasionally officers are deputed to see a particular work going on in another province.

Q. Do you think those means which you mention are sufficient to prevent over-lapping and to keep officers acquainted with what is going on elsewhere?—*A*. I think so.

Q. We had an extraordinary instance before us of what was obviously good work on cotton in Sind, and the same sort of work going on in the Punjab, and the two researches were conducted entirely independently of each other. They neither knew nor cared that similar work was going on a couple of hundred miles away. In your experience would you say that is an isolated instance, or do you think it might occur elsewhere?—*A*. I don't think it ought to occur. Had not the information been published in any of the Departmental publications.

Q. No, it had not got to that stage?—*A*. It might happen in the earlier stages before anything had been published in other provinces.

Q. Indigo was largely grown in the Madras Presidency before the introduction of synthetic, and it then almost disappeared?—*A*. It went down very low indeed.

Q. Now there is a recrudescence owing to the high price; does that come from the cultivator or is it stimulated by your department?—*A*. We did very little except to supply seed in the first year, 1914. We took special steps to get seed and supply as much as we could.

Q. What seed did you get?—*A*. Mostly from Cawnpore. We had not been working on indigo at all; it had come to be a minor crop and we knew very little about it.

Q. And you say that now the cultivators are trying to sell the leaf as they had forgotten the art of retting?—*A*. That only applies to particular places. I have had enquiries from people who had grown the indigo and asked us what to do with it, as they had made no arrangements for having it manufactured.

Q. Who purchased the leaf?—*A*. A certain amount of indigo in Madras is made from the dried leaf. It is peculiar to Madras. It gives indigo of apparently fair purity

Q. But there are people who do not own indigo plantations but who have vats and receive the leaf?—*A*. Yes, that is rather the exception. The ordinary thing is to manufacture from the green leaf, but owing to this being a new departure there have been some cases of that sort. I do not attach much importance to that point.

Mr. C. E. Low.—*Q*. Is that an old-standing practice selling dried leaf in Madras?—*A*. I think it is.

Dr. E. Hopkinson.—*Q*. Under present circumstances can much dried leaf be disposed of?—*A*. I don't know. I could not give any idea of the quantity. It is done more in the South Arcot side, but the main indigo districts are in the North and there they take the green leaf as far as I know.

Q. Are you taking any steps to stimulate the building of vats for steeping?—*A*. No, I don't think that will be necessary. The idea is to try and improve the system of manufacture.

Q. Are the vats in existence?—*A*. Yes, the old vats are in existence and can be mostly put in order. They have in fact been put in order. Many new vats have been or are being built this year.

Q. Who works them?—*A*. In a village the rich cultivator owns a vat or two vats, which he will work with his own crop and his neighbour's crop. In some districts up in Vizagapatam there are still a large number of indigo factories in the Bihar style mostly owned by one firm.

Q. You have no Planters' Association here for indigo?—*A*. No, it is only in the Vizagapatam district where there have been anything like indigo factories of ten and twenty vats, and they were all owned by one firm, Arbuthnots, who have failed. They have been taken over by another firm and have been put in use largely.

Q. What steps are you taking to make Mr. Hutchinson's discovery available for the benefit of indigo?—*A*. His research work is not complete as yet. He is only in the middle of it. The suggestion is that we should have a research officer in Madras on the improvements in indigo, and he should work in close touch with Davis and Hutchinson.

Sir F. H. Stewart.—*Q*. Have you not got a research officer here already who has done much work which is considered valuable?—*A*. On the cultivation. He is busy on paddy at present. I don't like to disturb the work he is doing now which is likely to be of more permanent importance than indigo.

Q. Of course the work of Hutchinson is of a very different character from that of Davis?—*A*. Yes, quite so, but they are both working in close touch.

Q. I put the same question a short time ago in another connection; do you consider that Davis's work would naturally come in the department of Director of Industries rather than in the department of Agriculture?—*A*. That I should say is really an agricultural matter, because so much of the manufacture of indigo in Madras is in the hands of the actual grower. I should be inclined to treat any manufacturing process carried on by the grower as being within the province of agriculture. It is rather hard to draw the line.

Q. When there is any vacancy among any of your research officers, what steps are taken to fill it?—*A.* The Madras Government would apply through the Government of India to the Secretary of State to appoint officers from home in the Imperial Service.

Q. Are you given the choice of several candidates, or is the appointment made at home?—*A.* I would not know. The correspondence would go on between the Madras Government and the Government of India. They might ask the Madras Government whether a particular officer would be acceptable, but the Madras Government would not know him probably.

Q. We were told in Bihar not by one or two witnesses, but by quite a number, that the improvements in the cultivation of indigo which had taken place during the last few years were so great that indigo could be profitably cultivated even at pre-war prices. Would you say that proposition would hold good here?—*A.* Since discussing the matter with Davis it seems to be possible. I don't say it is probable. I think the matter is worth investigating.

Sir F. H. Stewart.—*Q.* There is no possibility whatever of inducing co-ŏperation?—*A.* I think there are possibilities.

Q. Would there be any possibility of their combining in the future to manufacture uniform paste, for instance, if that was found to be a necessary process?—*A.* At present if they joined together for manufacture, each man would like to have his own stuff put through separately and get it back. They have not grasped the idea of bulking the produce and getting a profit. Each man would be afraid of not getting his real share. They would require a lot of education before they accepted co-operation. The Bihar planter manufactures on a sufficiently large scale to make a fair bulk of uniform product.

Q. They represent 12 per cent of the output, while this Presidency represents nearly 50 per cent, therefore their efforts will probably be nullified, unless this Presidency comes into line?—*A.* I think the Bihar indigo sells on the London market on its own merit, quite apart from Madras. It fetches higher prices now.

Mr. C. E. Low.—*Q.* You say in answer to question No. 21, " The scientific and technical department of the Imperial Institute has been of distinct use to the Madras Agricultural Department in valuing economical products." Have you ever tried them with reference to creating a market for anything?—*A.* No, I do not think so.

Q. Have you ever tried the Commercial Intelligence Branch of the Board of Trade?—*A.* I cannot think of any instance. There was a lot of correspondence about copra at the beginning of the war, in regard to diverting the market for copra on the West Coast to London. That is the case I think. This was all when my predecessor was in charge of the Department and I have not seen those papers.

Q. These valuations by the Imperial Institute—you had cotton valued by them?—*A.* I am not sure about cotton.

Q. Oilseeds?—*A.* We sent some soy beans which had been cultivated here. That was one case. I am corresponding with them about *senna*—the reason for the fluctuations in the *senna* market and generally on the question. We have had a fair amount of correspondence on different subjects in the past.

Dr. E. Hopkinson.—*Q.* Have you had any communication with the British Cotton Growers' Association in reference to the valuation or sale of cotton?—*A.* We have in the past, yes.

Q. Has it been direct between you and them?—*A.* I think so. I am talking from memory of papers which I have noticed casually. My last connection with cotton was about four years ago.

Mr. C. E. Low.—*Q.* What is your view about taking a somewhat wider interpretation of the reasons given in the Land Acquisition Act for which land would be required by Government? Do you think that it is in the public interests that land acquisition proceedings should be used more freely when requiring land for industrial concerns?—*A.* Yes, I think so.

Q. Do you know what the public opinion in Madras is on such a question at all?—*A.* If the acquisitions were done for European firms it would probably be looked upon with suspicion.

Hon'ble Sir R. N. Mookerjee.—*Q.* You say here that a committee was appointed two years ago to enquire into the question of the registration of title. Is there any way of our getting a copy of the report?—*A.* The report of the committee was published about two years ago, but the Government have not taken action on the whole of it.

Mr. C. E. Low.—*Q*. With reference to paragraph 11, in the case of research work by chemists, where would the analyst come in?—*A*. He is merely doing routine analysis; it would be in connection with some Government scheme.

Q. It might or might not. You have got a man doing analysis under the Customs Department. There would be no doubt a lot of scope for analysts in the Industrial and Agricultural departments?—*A*. I should be inclined to put those under (*a*). They ought to be under the control of the Local Government.

Q. You speak about having a non-expert administrator. This administrator would have nothing to do with control. For what purpose would it be necessary to value the scientific work of the expert?—*A*. What I was thinking of was that the question might come up as to whether a man was to be retained or his term of service extended. The Government of India who would decide that would naturally consult the Board of Experts who had seen his work.

Q. Suppose the question of selection of a man for a comparatively good appointment comes up?—*A*. That would be another instance.

Hon'ble Sir R. N. Mookerjee.—*Q*. Is there a Board of Scientific Experts?—*A*. Not of that nature.

Mr. C. E. Low.—*Q*. Not constituted for that purpose? Supposing that the Government of India have a vacancy in one of the higher scientific posts in the Agricultural Service, whose advice do they take as to filling it up?—*A*. Presumably that of the Agricultural Adviser to Government and the Board of Scientific Advice, I dare say.

Q. Do you know how he forms his opinion?—*A*. No, I cannot say. He should be in touch with the work.

Q. How would you constitute your Board of Experts? There would have to be experts on particular subjects. It would not be much good to call in a chemist to judge a botanist's work? Assuming, for instance the creation of a large scientific department under the Government, how would you constitute the Board?—*A*. They would probably consist of the heads of the research sections at the Central Research Institutes. That is my general idea.

Q. Another question in regard to the valuation of work—would you say that supposing a man proved a comparative failure as an analyst or educationalist, this body might advise the Government as to whether the man was likely to do better in another appointment, perhaps as a research man?—*A*. I suppose the Local Government if it had no further use for the man as an educationalist might offer him as a research worker.

Q. Supposing he was not of any use in research work, would such a Board be in a position to advise as to whether the man would prove an educationalist?—*A*. I think it would probably be done. It sounds probable that he would be offered to other Governments as an educationalist.

Q. You say, "The terms offered at present are perhaps sufficient at the start, but more provision should be made for substantial increase in the pay of experts who have proved their worth." That rather comes back to a somewhat similar point. How would you decide if an expert had proved his worth? By this Board of Experts and non-experts?—*A*. Yes. Their opinion would have great weight.

Q. In what form: would you put these men on different scales, or would you give them talent money or what?—*A*. I have not thought out anything definite.

Q. How do you think the experts would look at the question? Do you think they would have confidence in such a tribunal?—*A*. In the Board of Non-Experts? Very likely they would not. In fact, there might be great difficulties. I know that several experts might be working on the same bit of work and have different opinions about it.

Q. Would it not be possible for a man who is making an investigation on a certain point in agriculture, and who makes a certain discovery, the results of which he finds very satisfactory; don't you think that Government should pay him some sort of bonus for his intelligent working and discovering this thing?—*A*. I certainly think so, though I do not have much hope of its being done.

Q. Ordinarily, in Government service a man does not get any reward. So, I think it is desirable that a man should get some sort of reward?—*A*. Yes. Of course, there is danger in that sort of thing.

Q. Even then, a few thousands of rupees would bring great results?—*A*. I am more in favour of rewarding talent men who make great discoveries.

Mr. C. E. Low.—*Q*. You say, "The attempt at setting up a Research Institute for Agricultural Science for all India at Pusa has certainly failed so far as Madras is concerned, and a separate Research Institute for Tropical Agriculture is needed." Wherein do you consider that the Pusa Research Institute has failed so far as Madras is concerned? What did you expect, and which of your expectations were disappointed?—*A*. I do not know that we expected much. But the idea was that it was to be a Research Institute for all India but very little of their research work is of any use to us down here. They go in for wheat which is a crop we do not see here. Mycology we tried to carry on for some time with a serious palm disease, and other diseases, through the Imperial Mycologist. He recommended that we should have our own mycologist here, as the conditions were so different.

Q. But you have at present a Research Institute here at Coimbatore? Do you want more?—*A.* There is room for a Tropical Research Institute and a Tropical Agricultural Department, tropical as opposed to sub-tropical in Northern India, which might be quite separate from the local Agricultural College which is a different thing.

Q. There are things in Pusa which have been of use to you, such as indigo?—*A.* Yes.

Q. In a certain number of these things the work has to be done absolutely on the spot; some can be done in laboratories. How would it be if you had your Central Research Institute? The expert would come from Pusa more freely for more or less prolonged periods?—*A.* Yes.

Q. It would not do to have a man visiting the areas he wanted to look into in camp?—*A.* I do not think that will be enough. Take the investigation into paddy; you want a whole time man working at it all the time.

Q. If you had your Research Institute at Coimbatore, and he had to visit other parts of Madras for prolonged periods, the distance would be a relative factor. You have, of course round Coimbatore certain conditions of Madras agriculture which can be reproduced, but in regard to conditions obtaining on the West Coast, he would have to visit the West Coast from Coimbatore?—*A.* Yes.

Q. Wherein would be the difference—if you had a man working, say, in the Coimbatore laboratories as a member of a Central Research Institute and visiting various parts of Madras, or working in the Pusa laboratories and visiting Madras and other places?—*A.* If he is stationed in Coimbatore, he is much closer in touch with agriculturists, and members of the agricultural staff.

Q. But in less close touch with other parts of India where some of these items may be of great use?—*A.* Well, if we are dealing with paddy it is not the case. Really Madras and Bombay go together.

Q. Paddy is a crop which is grown in a number of provinces in India. How would it be, supposing a big scheme of paddy research were taken up all over the place with men attached for greater or shorter time in these provinces? Or take another instance. Supposing the arecanut or cocoanut is being taken up,—you find it in Madras, Bombay and Bengal—if you had a man working on those solely in the Madras Institute, his results would be less liberally available in the Bengal and Bombay provinces than if he were working attached to the laboratories of each province and working in close touch with Pusa?—*A.* Yes. It might be possible.

Q. For instance, I understand it is the case that Dr. Barber's help is very much appreciated in the United Provinces. Supposing he was attached to the Madras Agricultural Department, he would not be directing so much of his work as he is doing now?—*A.* I do not propose that it should be under the Madras Local Government. It ought to be for all India, or the tropical part of it, dividing Pusa up into sub-tropical and tropical sections.

Q. Has that been much discussed, in more detail?—*A.* It is under discussion now.

Q. Has any discussion arisen about Ceylon coming in?—*A.* I do not know.

Q. A great deal has been said by the public at different times about the neglect of Government to turn Indian sugarcane-growing conditions into conditions like those in Java. The Government has been blamed for not making a Java out of India. Has the issue ever been put publicly that one of the main reasons why Java succeeds is that it gets land undervalue and owing to the conditions which have prevailed there so long in the past, the ryot is practically compelled to grow cane?—*A.* It may have been mentioned, I do not know. There may have been articles in the press, but I cannot remember them offhand.

Q. Would you very kindly have prepared the prices at some convenient centre where cane growing and paddy growing compete, showing for the last fifteen years or so what has been the price of *gur* and paddy respectively?—*A.* Yes.*

Sir D. J. Tata.—*Q.* In answer to questions 41 to 43 towards the end, you say, "Considering the great size of India I am not in favour of specialised Research Institutes for all India." What is it you exactly mean by this?—*A.* I am alluding to the proposal, so far as I remember, of having central institutions of chemists and other specialists. I think that was the proposal in the question circulated.

Q. You are not in favour of specialised Research Institutes for all India?—*A.* I mean, Institutes of Chemistry for all India, or an Institute of Botany for all India. That is what I meant by the word 'specialised'. In the case of agriculture, it is a question of climate. Northern India agriculture is different from southern India agriculture. One is tropical and the other sub-tropical.

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* Vide statement printed after oral evidence.

Q. For instance, you would put a research institute connected with the cotton industry in Bombay, one connected with sugar in the United Provinces, and one connected with jute in Bengal? Is that what you mean?—*A.* Yes. That is the idea.

Q. And also that India is too big for one Central Institute that would deal with all questions?—*A.* Yes. The conditions are too varied.

Q. And there should therefore be several research institutes spread over the country to suit the requirements of various localities?—*A.* Yes.

Hon'ble Sir R. N. Mookerjee.—*Q.* You are the Director of Agriculture. That means that you are the head of Agriculture in Madras practically?—*A.* Yes.

Q. In this College you have four or five scientific men under you?—*A.* Yes.

Q. This means that each one is engaged in discovering certain items by which you can improve certain sections of agriculture. Supposing one is successful in discovering certain improvement the next item of the work would be for the agriculturist to carry it into effect by practical demonstration?—*A.* Yes.

Q. If he does not do it, or refuses to do it?—*A.* It would be my business to see that the thing is given a fair trial.

Q. Generally, you are not specialised in either agriculture or science?—*A.* But I can decide whether a man was carrying out a bit of work with energy. If any one deliberately deceived in a scientific sense, I do not see I could do anything.

Q. Not actually, but in scientific work it so happens that one scientist may not agree with another scientist's discovery. Then what is the control? Why I ask that question is because you said that in agriculture you thought a chemist should be quite independent of any other big institute?—*A.* Any question of agricultural chemistry would not be tried by one man but by different people. They surely would not treat the thing with contempt.

Q. Supposing that some scientific man for bad treatment by the Head of the Department imaginary or real becomes discontented and may therefore not do his work as actively or energetically, what control you have over him to find out that he is not doing his work as whole-heartedly as he should do as a whole-time officer?—*A.* One has to do the best one can. I can form a fair idea as to whether a man is doing useful work, I think.

Q. It is very difficult for you in research work?—*A.* One can discuss his work with his fellow experts in other provinces and at Pusa, and I think one could form a fair idea.

Q. You have not had occasion to do it?—*A.* No.

Mr. A. Chatterton.—*Q.* Has the Agricultural Engineer attached to the Department the status of a Deputy Director?—*A.* More or less. It is rather vague. He is appointed by the Madras Government but is not a member of the Imperial Agricultural Service.

Q. Is it a permanent appointment or temporary?—*A.* Permanent, but the present incumbent is on probation.

Q. Is there scope in the Department of Agriculture for the development of much engineering work?—*A.* It depends on how much you take under the head of agriculture. There are the oil engines and pumps and a certain amount of agricultural machinery,—if we include things like decorticators, ginning and sugar mills. There is room for a lot of work in improving ploughs, harrows, etc.

Q. Is there scope for the employment of really first class men for this sort of work, or are you contemplating the type of man who is competent to erect machinery?—*A.* It is difficult to say. On general principles you want a good man.

Q. Are you likely to get a good man isolated in this way in the Department presumably with no prospects of promotion?—*A.* It is difficult. It is a very specialised job.

Q. For instance, a ryot goes to you and asks for advice in regard to dealing with the water supply question, irrigation, etc. Your Agricultural Engineer takes this up and tenders certain advice. Then comes the question of the type of machinery which should be employed. Is it not necessary that you should have a tolerably experienced man of some status as an engineer, who would deal with questions which would arise as to the suitability of different classes of plant which the ryots are advised to use?—*A.* Certainly.

Q. Do you think it would be better from an administrative point of view, and from the point of view of efficiency, if such work were done by the Department of Industries rather than by the Agricultural Department?—*A.* Advice as to the type of machinery to be used?

Q. Yes?—*A.* Yes, in some ways. There is a lot to be said on both sides

Q. What is the pertinent argument in favour of having an agricultural engineer under the Agricultural Department rather than the old system which was in vogue here?—*A.* It was discussed at great length and I have read the discussions and it is rather difficult to understand, but there are arguments on both sides. You can always argue both ways. You must have an engineering side to the Agricultural Department for the matter of improvements of ploughs, winnowers, etc. But the question of machinery, pumps, etc., is a question which you can argue on both sides, being a question of convenience.

Q. You want to have, as far as possible, agricultural implements made in the country?—*A*. Yes.

Q. That is purely work which you can consign to the Department of Industries, so that officers in the Department of Industries will be in touch with the Agricultural Department as to their requirements. Does this not rather lead to the question as to the exact definition of the sphere of work of both the Departments?—*A*. It is an extremely difficult thing to define. They overlap.

Q. There has been a want of co-ordination between the two Departments to a certain extent. You have one Department advising that a certain course should be pursued?—*A*. One man advising a man to put in certain elaborate machinery, and the Agricultural Department saying that the crops would not repay such an expenditure.

Q. Would it be desirable, you think, to have greater co-ordination between these two Departments by the appointment of an official superior to the Directors of both Departments, such as a Development Commissioner?—*A*. How would he be recruited? What would be his qualifications?

Q. Leave that out?—*A*. I think it all depends on that.

Q. Do you think that if the two departments were directly under Government that co-ordination could be obtained?—*A*. I do not think it would. The experiment has not been going on very long only since last November so it is rather difficult to say.

Q. With regard to this question of publication of scientific results by research officers, do you think that they are men of sufficient status to determine whether the results should be published or not—the provincial ones? I mean, without reference to the opinion of the Board above them?—*A*. I should say "yes" in most cases.

Q. It is the exceptional cases that you would have to deal with?—*A*. That is the difficulty.

Q. If a man publishes a bad work that would lower his own reputation. Why should Government take any official responsibility in regard to the publication of scientific work?—*A*. As far as outside reputation is concerned, the matter would right itself. But in regard to local reputation in India, I do not think the public reading it would be able to distinguish between good and bad work. It would not be good for the reputation of the Department to allow bad work to be published under its auspices.

Sir D. J. Tata.—*Q*. Do you see any hope of carrying out research work in your Department with the help of Indian research workers in the immediate future?—*A*. Gradually; not in the immediate future. But we have some very promising young men coming on and in the ultimate future we might have a large number.

Q. I am asking the question with reference to the teaching in research institutes. Should there not be attempts made to bring in young men to do research work?—*A*. Yes.

Q. That could only be done by the professors or experts who come out to do research work associating young men who are under them in the research; so that they would combine research work with teaching?—*A*. Why is it necessary to combine research work with teaching?

Q. How could these young men be brought up to do research work unless they associated themselves and were taught to do research work, taught methods of research?—*A*. I do not think you could teach methods of research. The man ought to know the methods before thinking of research. He learns that first. He can be given opportunities and general guidance but you cannot teach research.

Mr. C. E. Low.—*Q*. Perhaps it may be desirable to pursue the point a little further. If a student means to get a chance of doing research work, has he not to be in the research atmosphere and is that atmosphere likely to be created when you have research men spending half their time in teaching?—*A*. I agree with you that it would create a better atmosphere if the men did not do any teaching.

Sir D. J. Tata.—*Q*. Unless they added teaching how could they inculcate research into their students?—*A*. My point is that you cannot teach research. To some extent he can be taught by being associated with research workers.

Q. According to you, there is very little hope of providing research workers in this country unless they have the spirit and go out and try to do research work?—*A*. I don't say there is very little hope. I think they will be gradually produced, but the more research work we have going on, the more rapidly will young men be trained to do research work.

Q. We will take a chemist who is doing research work. He has two or three students helping him in his work. These boys would see and learn the methods which the expert employs in carrying out the investigation. That would give them a bent and they would apply the methods in their own investigations subsequently?—*A.* That is what happens at Coimbatore. It is actually being done.

Statement showing the price of paddy (second sort) and jaggery in terms of seers of 80 tolas per rupee.

(*Submitted after oral examination.*)

Station.	1905–06.	1906–07.	1907–08.	1908–09.	1909–10.	1910–11.	1911–12.	1912–13.	1913–14.	1914–15.	1915–16.
Peddapuram (Godavari district). ..	16·91 * 7·1	13·5 8·6	12·4 9·2	12·4 7·5	15·9 6·4	18·0 6·7	12·6 6·7	11·2 6·9	11·6 8·5	11·5 8·0	10·0
Coimbatore ..	13·07 * 7·6	12·5 9·9	12·9 7·8	12·1 7·5	13·1 6·8	12·4 6·6	12·2 7·8	11·1 7·3	10·9 7·4	10·6 5·6	11·6
Chittoor ..	16·62 * 7·3	14·8 9·0	13·5 7·8	11·8 7·0	15·9 5·9	17·5 5·7	14·4 6·5	12·3 6·6	13·0 7·8	14·3 5·5	14·9
Hospet (Bellary district).	17·88 * 6·2	13·9 7·5	11·5 8·3	10·6 8·3	10·8 6·2	11·3 6·1	11·5 5·9	11·5 6·4	11·3 8·4	12·2 5·0	13·3
Kallakurchi (South Arcot district).	16·37 * 9·4	15·4 11·2	14·3 9·7	13·8 8·6	15·0 7·2	16·1 7·1	14·7 8·7	12·8 8·6	12·3 9·4	14·6 7·5	14·9
Do. (figures furnished by Messrs. Parry & Co., Madras).	* 9·3	9·5	9·7	9·3	7·4	7·0	8·1	8·3	8·3	7·8	5·2

* *N.B.*—The *lower figures* in every line and the figures in the last line represent the price of jaggery in terms of seers of 80 tolas per rupee.

WITNESS No. 262

MR. R. D. RICHMOND, *Deputy Conservator of Forests, the Nilgiris, Madras.*

WRITTEN EVIDENCE.

The existing knowledge of the forest resources of the country requires to be supplemented by further enquiry and research. Little is known of many of the so-called minor products of the forests in regard either to their occurrence or their commercial value and the same is the case in regard to the timbers. What is required then are research officers to ascertain the uses and values of the various products, the extent of their occurrence and the best methods of producing them and ensuring their continuance or the continuance of the trees producing them. This must be the first step and until this very necessary information is collected it is difficult to see how any progress can be made. The Imperial Research Institute at Dehra Dun does work of undoubted value, but it must be supplemented by local organizations.

A point of great importance is that it would be sheer folly to exploit timber or other forest products until it is known how to replace the trees which would be removed in the process, and we are singularly ignorant, at present, of the methods of growth and regeneration of the hitherto little known species for which attempts to find uses and markets are sure to be successfully made. Sylvicultural research is thus one of the first requirements; equally important is the economist to ascertain the uses of the various products, the best means of harvesting and seasoning them, and to present them to the market. Much depends upon how timber is seasoned, many of the at present unsaleable timbers would possibly find a market if seasoned in the right way. Having learnt how to season the timber trial consignments should be given to firms who are interested, and if this timber is found useful it must be possible to follow it up by larger consignments properly prepared. The market will lose interest if, that interest having been provoked, it cannot be supplied at once with marketable quantities of what it has tested and is in want of.

It is possible that a special staff, not necessarily Forest officers, should be in charge of the development of new industries and in finding markets for new timbers.

Capital is very shy of forest enterprises and it is probable that any new industry should be started by Government, and if successful, it could then be handed over or sold as a going concern. Government management should be in the hands of a commercial staff, the official is ordinarily ill-fitted to run commercial concerns.

Another point requiring attention is the introduction of better methods of exploitation, more and better lines of communication.

Industries such as paper-making and the manufacture [illegible] are already in existence in this country and it is possible that [illegible] not necessary, but Government must help in the direction of the [illegible] materials required. In regard to these special industries it is to be [illegible] is required more often than not occur very scattered in difficult country [illegible] probably pay better to make plantations of the species required in [illegible] the factories. Whether this would be worth while or not is a matter of [illegible] calculation in each case.

A point to be insisted upon is that a large area of our forests [illegible] at present will not bear much working, they are degraded from centuries of neglect [illegible] be in the process of restoration. I consider that this is not sufficiently [illegible] that more of the revenue derived from forests should be put back into [illegible] the object of improving them and that before very much will be possible [illegible] industries the raw material must be improved. On the other hand there [illegible] where immediate development is possible. The forests of the country [illegible] real asset to the people, directly and indirectly, both to those who live in [illegible] vicinity of the forests and to those who have never seen a forest [illegible] owes it to future generations to consider their interests equally with [illegible] present generation. The forests are the property of the people in the [illegible]

It must be made clear that the present strength of the [illegible] is insufficient for purposes of protection and the limited amount of exploitation [illegible] on, and that for purposes of research, improvement and further expansion [illegible] be largely augmented.

Madras is chiefly agricultural and probably will remain so, there is no coal and wood fuel is expensive at centres where there are industrial concerns. I cannot pretend to any real knowledge of the subject, but it occurs to me that charcoal, produced by destructive distillation, with its valuable by-products, might do something; while hydro-electrical schemes might do more. This latter question is bound up with the question of the conservation of the water sources which has not hitherto received the attention it deserves.

Industrial enterprise is in no way hampered at present by the working of the Forest Department which welcomes any market for its produce and prefers to hand over the working to private parties: where the department is essentially backward is in introducing to the public notice a knowledge of the uses and the value of the products available. This can only be rectified by a research organization.

The Director of Industries has not, in my experience, materially assisted in placing any forest product on the market or helped to open out any forest industry. He is not a business man and is in no way in touch with the department.

I would suggest a Board of Industries to which all completed investigations would be reported, which might direct the lines of investigations and which could possibly, with advantage, issue bulletins in simple language in the vernaculars in a periodical and also in the district gazettes. The Forest Research officers and engineer should work under the orders of the Chief Conservator of the Province who should be a member of the Board of Industries. The forest commercial staff engaged on pioneer industries might work directly under the Board which should be largely composed of business men with an official chairman.

ORAL EVIDENCE, 7TH FEBRUARY 1917.

Sir F. H. Stewart.—*Q.* You say, "The Imperial Research Institute at Dehra Dun does work of great value, but it must be supplemented by local organizations"? Will you explain shortly why?—*A.* Because the species of trees and the conditions of locality are different.

Q. Is it your opinion that the needs of each province would not be met adequately by an enlargement of the institute at Dehra Dun?—*A.* It would be adequately met by appointing a man as a sylviculturist whose sole duty would be in connection with Madras, which comes to the same thing as having a man in Madras and it would be more satisfactory.

Q. It would be more satisfactory to have a separate institution in Madras and a separate staff?—*A.* Yes.

Q. It would be very much more expensive?—*A.* Yes, and it would be worth it. I do not think that it would be very expensive. It would mean an extra individual.

Q. An extra individual as sylviculturist, but others for other branches?—*A.* So far as the chemist is concerned one man would do, or the chemical work for all departments might possibly be done by one man.*

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* Since making this statement I have seen the work at Dehra Dun and now realise [illegible] the chemist, botanist, sylviculturist and economist work together, and must therefore modify my statement. A chemist would be necessary for the local research institute.

Q. With reference to your remarks about the seasoning of timber, does your department do anything in that line?—*A.* Nothing. There is no water seasoning or any scientific method of seasoning carried out.

Q. You deliver the types directly from the wood?—*A.* Yes.

Q. And you think that seasoning comes within the province of your service?—*A.* Not the actual work. As soon as the research work is over it could probably be handed over to commercial men.

Q. You say, "The forests of the country should be a very real asset to the people, directly and indirectly, both to those who live in the immediate vicinity of the forests and to those who have never seen a forest." Certainly, but surely those who live in or near them have special claims of their own?—*A.* They have their justifiable claims but I do not think that the people who live further away ought to be forgotten.

Q. In the matter of grazing rights and fuel?—*A.* Those, of course, would go to the people in the immediate neighbourhood. They are not transportable items.

Q. With reference to the appointment of the Director of Industries, you say "The Director of Industries has not, in my experience, materially assisted in placing any forest product on the market or helped to open out any forest industry." Would you recommend the association with the Forest service of a man with commercial training for that purpose?—*A.* Yes.

Q. Would you make him a member of the Forest service?—*A.* It is difficult to say. It is a question of detail, but I do not think it would matter very much. It does not matter what cadre you put him on to.

Q. It might matter a good deal, because if he was a member of the Forest service he would hardly rise to be the head of it?—*A.* No. Surely you might put him in a separate branch. You could not possibly make him the head of the Forest Department. He would not be trained in forestry.

Q. You say that the Board of Industries might issue bulletins in simple language in the vernaculars in a periodical and also in the district gazettes. You think the ordinary people would read these?—*A.* I think they do. It merely occurred to me as a way of circulating information.

Q. Are these bulletins distributed free? Can any one get hold of them?—*A.* They can be bought. For Government servants they are free.

Mr. A. Chatterton.—*Q.* In the Nilgiris there are considerable forest plantations?—*A.* Yes.

Q. And they have been of great advantage to the locality?—*A.* Yes, very great indeed.

Q. Can you tell us at what price firewood can be obtained up there?—*A.* We deliver it at houses at about Rs. 5-8-0 per ton.

Q. Would it be practicable to develop these plantations to any large extent with a view to supplying fuel to Coimbatore?—*A.* I think it would.

Q. Of late years, has there been any extension of this planting, or has it been given up?—*A.* There is no planting going on by Government but a certain number of private ones are being started.

Q. Is there any large area of Government waste land up there?—*A.* Not a very considerable area. You wrote an article on the subject of "Destructive Distillation" and I was asked to check the figures, the area required to supply the quantity of charcoal you quoted came to something like 4,500 acres.

Q. And the cost of clearing land for that purpose?—*A.* The cost of formation of Eucalyptus plantations would be about Rs. 50 an acre. Taking very liberal figures, my figure for delivery at the factory of which you wrote came to Rs. 3-8-0 a ton. That included establishment and everything. Let us call it Rs. 4.

Q. Can you send to the Secretary of the Commission a copy of this?—*A.* Yes. I can send a copy of the note* that I then wrote.

Q. Are there peat bogs in the Nilgiris?—*A.* Yes.

Q. Do you think whether they are of commercial importance?—*A.* I believe they are, but I do not speak with any real knowledge.

Q. They are being worked at the present time?—*A.* Yes, to a certain extent. They are not used as fuel.

Dr. E. Hopkinson.—*Q.* You say towards the end of your note, "The Director of Industries has not, in my experience, materially assisted in placing any forest product on the market or helped to open out any forest industry. He is not a business man and is in no way in touch with the department." How far does your experience go?—*A.* I am not sure how long there has been a Director of Industries. I have put in fifteen years' service. I may mention that I have sent him a lot of things to investigate. I am not, of course, speaking of any individual. There is nothing personal.

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* Not printed.

Q. The point that you want to bring out is that there is no close touch between you and that department?—*A*. They do not know what we are doing and we do not know what they are doing.

Q. And you think that the problems that you bring up to the point of solution as far as pure forestry is concerned should be taken up by the Director of Industries to translate them into commercial propositions?—*A*. I do not know that I would give them to the Directors of Industries as at present constituted. I do not think I have great confidence in him.

Q. But you do want somebody? It does not very much matter what you call him?—*A*. I do want somebody, some business man.

Sir F. H. Stewart.—*Q*. Is that the idea of the appointment of Mr. Lushington?—*A*. I cannot speak of his appointment. But it is the thin end of the wedge of research. More really he is the economist. I think he is going to be engaged on the seasoning of wood. He was a member of the Forest service: he recently retired and has been re-appointed.

Dr. E. Hopkinson.—*Q*. He would hardly be able to carry things into the commercial region?—*A*. Whether he is going to or not I do not know. That is the sort of thing, which I think will be better done by a business man.

Q. Are difficulties of extraction very great?—*A*. They are very manifest. It is very expensive. It is possible better means could be devised.

Q. You have no suggestions on that head?—*A*. I mean there again you want rather an expert in those particular matters, as to whether you want tramways, or a better system of roads, or whether you can use water and improve the rivers.

Q. There is no one to whom you can refer these questions?—*A*. No specialist. A forest engineer has recently been appointed.

Q. At Dehra Dun?—*A*. He is in this province, and that, of course, really comes within the scope of his duties, I suppose. But so far as I am aware it is not the kind of work on which he has been employed.

Q. When was he appointed?—*A*. Two or three years ago. He has been mostly engaged on road work. He is not a member of the Forest Service, but an officer of the Public Works Department. He is attached to the Forest Department for the time being.

Q. The school of forestry here is a teaching institution entirely?—*A*. Yes.

Q. You have no research officer at all?—*A*. No.

Q. Supposing that in the course of your duties you came across some problem which should be the subject of research would you refer it to Dehra Dun?—*A*. I was once asked to suggest things for the Dehra Dun programme. The programme is made three years ahead. There are frequent transfers and there is difficulty in securing continuity of action. For the last year I have been working on the Nilgiri tanning barks, but I cannot devote undivided attention to any such special work.

Q. What about the chemical side?—*A*. I have sent samples up to Dehra Dun and the analyses have been made there. It is a makeshift sort of arrangement.

Q. You think it would be an advantage if research officers were attached to the provincial colleges of forestry?—*A*. They would naturally work in the same place and in the same building, but whether they ought to be connected with teaching or anything of that kind is a problem to which there are two sides. It would be difficult to fit it in, if they had to do teaching as well.

Q. Another way of dealing with it is that, if an enlarged scientific staff is established at Dehra Dun or at some other central institution, you could apply for an officer to take up any particular work in this province?—*A*. My point is that there is work for a man continually. We want a whole time man in Madras.

Q. If you had men at Dehra Dun, one might be an expert in a particular branch, and when a problem cropped up in that branch you would get that special expert for that particular matter. He would work it out and then return to the Dehra Dun headquarters and you would get another man for some other subject and so on?—*A*. I can see your point, but the sylviculturist is the thing I am thinking about. The locality is different and the species is different and I do not think that that arrangement would act with regard to the sylviculturist in any way at all. He would have his experiments here and he would have to be continually watching them. Measurements have to be periodically made and all these observations will have to be recorded. I think it will be a hopeless proposition to have him at Dehra Dun.

Q. You think that it is quite essential to have your own man engaged on research attached permanently to the Madras Presidency?—*A*. Yes. I feel very strongly about it.

Q. How do you meet the difficulty of it being a blind alley occupation for a scientific man? If he is a real expert of some distinction, he would not be content to stay as a chemist in the Forest Department in Madras all his life?—*A*. No. Possibly in regard to the chemist it would not require the continuous service of one man. You might link him on with the chemist who is doing research in some other business.

Q. You make a distinction between the chemist and the botanist?—*A.* Yes. You must have your own sylviculturist and your own economist. You might have other specialists, but personally I do not think they are needed so far as I can see at present.

Q. You think that the economist ought to look to it as a lifelong occupation so long as he remains in India?—*A.* If he is not a Forest officer, yes. The point is whether you would be able to employ some one who is not a Forest officer as an economist. It is an open question, but at present at Dehra Dun the man is a Forest officer, and you could not keep him permanently at the work.

Q. Would you prefer to have the forest economist as a forest officer?—*A.* I think I should.

Q. And there is no reason in that case why he should not become Director-General?—*A.* He would be a member of the service and would go on in the same way as his confreres.

Mr. C. E. Low.—*Q.* Was it not the case that the Government of India had a very excellent officer as a botanist in Dehra Dun and he offered to stay on, losing promotion?—*A.* I am afraid I do not know.

Dr. E. Hopkinson.—*Q.* What scientific officers do you think are necessary for Madras?—*A.* We want an economist and a sylviculturist. We, of course, want a chemist or the services of a chemist. The botanist is doubtful, I should think.

Q. I take it you want also an engineer whom you have now got?—*A.* Yes.

Q. I suppose you would put the engineer in the same category; he could be taken from some central department?—*A.* Yes. He could. I do not know if entomological work might not possibly be done at Dehra Dun.

Q. Sir Francis Stewart asked you about the methods of publication and so on. May I take it that they are on the same lines in the Department of Forestry as in the Department of Agriculture?—*A.* The Dehra Dun Research Institute issues bulletins which are sent to the members of the department.

Q. If you have something particular to which you wish to draw attention?—*A.* One could write an article for the departmental magazine.

Q. That would be sent to Dehra Dun and it would be rejected or published?—*A.* Yes.

Q. And that is quite satisfactory?—*A.* Yes, except that some of their issues regarding species of trees, particularly of Madras, have been rather feeble.

Mr. C. E. Low.—*Q.* There is one question about the research institute. You contemplate having local control?—*A.* I should have it under local control—under the control of the Chief Conservator of the province.

Q. And not the Inspector-General?—*A.* When we get the Chief Conservator at the head of the province the Inspector-General will no doubt become the head of the department in Madras as elsewhere (except Bombay).

Q. It would not increase the Inspector-General's influence to exclude him from his place in the research institute?—*A.* But at present he has no influence in Madras.

Q. We will assume that in this province the forest administration becomes ideal, from your point of view, then what is your view about the research institute?—*A.* I should still think, under the local Government.

Q. Would there not be a lot of things that would be of use to the Forest Department in Burma, Andamans, etc?—*A.* I do not think so. At any rate, they have our publications in the same way that we have theirs.

Q. There would not be free correspondence and interchange of ideas between the officers of the several provinces?—*A.* I think there could and would be. The direct authority in local research is the Chief Conservator and it is far better to have his direction than the Inspector-General's. The Inspector-General can only act on the Chief Conservator's advice.

Q. You put it this way that Dehra Dun is rather for the Punjab, the United Provinces, Bihar and Orissa, Bengal?—*A.* I confine myself entirely to the Madras Presidency. I know nothing of the conditions of the other provinces. I think it unlikely that the conditions vary so much in the northern provinces as they do between the north and south of India. Here you are tropical and there you are not.

Q. If you put it on tropical grounds, then presumably there are other tropical areas in the Indian Empire—the south of Burma?—*A.* Yes.

Q. If you say for Madras only, I do not entirely follow you?—*A.* My point is this, that I should not be satisfied with research work in Madras from Dehra Dun, from men living at Dehra Dun and operating at Dehra Dun. I think one man will find ample to do in the Madras Presidency.

Q. I think there are instances in Madras, where forests have either disappeared or almost disappeared owing to unrestricted user?—*A.* Many of them are obvious.

Q. Can you mention instances?—*A.* I can mention instances in Tinnevelly and in Coimbatore. Some of these forests have entirely disappeared.

Q. Supposing a firm writes to the forest officer of a district and asks what quantity of the products of a tree is available and at what price, the forest officer replies that there is a limited number of trees in somewhat scattered distribution in certain ranges. How much further could the commercial man take him and in what way?—*A.* He ought to be able to give him the exact quantities and the price.

Q. It is not a question of a commercial frame of mind, but an increase in the matter of knowledge of things available. I am trying to get at the exact state of things that he will have to do?—*A.* He would have to ascertain that a certain wood was useful for a certain purpose, and he would try and find if there was a market for it, but what quantities he would get would be got from the forest side and he could not give that information.

Q. What about this question of your local contractors? You sell your coupes to local contractors, and when there is a species wanted, the contractor holds the thing up and that is the general complaint?—*A.* He would not have the monopoly of the thing.

Q. You would not advise that coupes should be sold with certain species except for instance?—*A.* You might if you found that there was a demand for a particular species. It is rather a clumsy arrangement.

Q. You could sell it on the understanding that he agrees to sell these excepted species not exceeding a certain price at a certain place?—*A.* Yes.

Q. It could be done in that way?—*A.* Yes.

Mr. A. Chatterton.—*Q.* You referred to the fact that you are doing research work. With what particular object?—*A.* To try and find out a market for the tanning barks of the Nilgiris.

Q. Is there a sufficient quantity to make it a commercial proposition?—*A.* Of the two Australian wattles (*Acacia decurrens* and *Acacia dealbata*) which are useful for tanning purposes and grown on the Nilgiris, etc.—the *Acacia decurrens*—is far more rich, in tannin than the other but the *Acacia dealbata* is far the commonest. I am trying to get our tanners to use the common kind and although it is not as good as the other, still it contains 17 per cent of tannin. There is a possibility of setting up an extraction plant there. All that wants to be worked out. It is very difficult to work it out all at once, I have not got the knowledge nor very much time for a special work of this kind. I think there is a possibility of something being done. There is not only Government bark but a great deal of wattle on private lands.

Mr. C. E. Low.—*Q.* We have just received a book from the Inspector-General of Forests in which many doubts appear to be thrown on the commercial possibilities of wood distillation. Do you think it is a proposition of immediate importance in Madras—wood distillation and provision of coke?—*A.* I know very little about it. The difficulty in the Nilgiris is that you have got long distances for transport.

WITNESS NO. 263.

MR. C. D. McCARTHY, *Conservator of Forests, Western Circle, Madras Presidency.*

WRITTEN EVIDENCE.

From the point of view of extraction, the establishment of the Forest Department is built for the exploitation of such major forest products *only* as timber, fuel, bamboos and so forth. The department exercises practically no control over the collection of other products. For example, its connection with barks, fruits, gums, honey and wax is limited to selling the right of collection, and we are ignorant even of the quantities collected under these leases. We are undermanned even for the scope of our present work; nor do our current re-organization proposals go beyond dealing with it. And although we attempt to reply to enquiries concerning the commercial exploitation of products which are not in the regular line of collection, it must be admitted that the results are seldom of any use. The fact is that our staff is not formed for this purpose. It is trained and concentrated on the protection, improvement and exploitation of the forests and it is waste of time and training to use it otherwise.

I will take two enquiries as typical of what we are frequently asked to do for commercial firms. The first might be "Please inform us in what localities the fruit of *Schleichera trijuga* is obtainable in commercial quantities and give us an estimate of the cost of collection and delivery at the nearest railway line." The next would be—"Can you supply soft wood suitable for tea boxes, if so in what quantities and at what rates. The wood must be supplied in the form of planks or squares."

In both cases the department is able to do little more than specify the localities in which the raw product is obtainable. As regards the first we have no collecting agency. We should either have to organize one amongst the forest tribes who collect similar products for the minor forest produce contractors, or else go to these contractors for quotations. One need hardly say that the information provided in this way is not likely to be of any assistance to the enquirers. In the second case it is obvious that the wood supplied must be seasoned—(in this instance, by immersion) and that it must also be sawn up. Now this department only supplies fresh cut timber to the dealers. We have no seasoning depôts of any sort and we have no sawing machinery. Nor would it be reasonable to expect us to set them up to meet such demands.

I must repeat however that it is not the function of the department as it stands to meet such demands nor do I recommend that it should be utilized in that way. We cannot become the collecting agents for individuals nor can we take the place of the retail dealer or the saw mill to supply this and that consumer.

Proposals have been set up for the addition of a local research staff to the Forest Department in Madras. In my opinion, when it is formed its work should be confined entirely to professional forest subjects. Owing to the employment hitherto of the existing staff in holding enormous divisional charges there has been little professional knowledge collected even upon such essentials of our work as the rate of growth and regeneration of any of our principal timber species with the result that the all important point of the proper felling rotation in timber and even in fuel forests, is largely a matter of guess work. There is an immense amount of professional work awaiting this branch in half a dozen other directions and I am totally averse to any proposal to utilize this staff when we get it upon such refinements as investigations into dyes, resins and tans whilst the very spade-work of the profession is yet to do. This should be the duty of a totally different establishment and requires attainments and training which the education of a Forest officer does not supply. In my opinion also it would not be advisable to attach a commercial or scientific officer to the forest research staff. I understand that some such proposal has been made with the object of establishing a closer touch between the Forest Department and that of industries as well as with the outside commercial world. Every one of course is in favour of furthering this connection, but I think officers of these attainments would be far more usefully employed in the Department of Industries; and that closer relations with the Department of Industries would be best attained by a system of conferences between the heads of the two departments.

On the subject of forest transport we appear to have reached the stage when we must begin to employ mechanical means and to improve and utilise our resources of water transport. We have about reached the limit of what native labour and cartage can do for us. Of late the calls upon the latter by mercantile and industrial development have very considerably increased; also it is not possible to establish a paying transport service with large Government establishments of bullocks and cartmen for the exploitation of the forests in remote and unhealthy localities. The trouble in making a start with mechanical transport here, in South India, is that there is absolutely no reliable agency or advice to assist us in these matters. Unfortunately also the few attempts that have been made have been, as far as my knowledge goes, without exception, failures, and it is difficult therefore to get a hearing for such proposals. The cause of these failures seems to be that in the absence of independent professional opinion we have been obliged to go direct to the makers not only for the material, but for advice of what material we wanted. And the result has been either that the mechanism supplied was not suitable for the work or that it was too big and expensive for its job. In this Presidency we have lately been given a Forest Engineer who is doing useful work in the alignment and construction of export roads into the more remote and inaccessible hill tracts and forests, but it is too much to expect the special knowledge required for providing light railways in hill forests from one and the same officer. What seems to be required is that specialists qualified to advise on such subjects as light forest railways and tramways, sawmills and engines should be available. The Forest Department in this Presidency would itself be able to keep two such officers fully employed.

As regards waterways there is an enormous development of transport available in the river systems of the West Coast. For a short period of the year these rivers are already utilized for rafting or boating for forest and agricultural purposes. But owing to the fall of water after the rains the floating comes to a stop from January to June. This is frequently owing to a diffusion of the dry weather supply amongst a number of channels in the river bed. If the available water could be concentrated into one of these the floating and rafting period would be considerably extended, whilst if an efficient system of submersible lochs could be devised they might very frequently continue all the year round. Here again we appear to be up against the same thing.

RAL EVIDENCE, 7TH FEBRUARY, 1917.

Sir F. H. Stewart.—*Q.* You say that proposals have been sent up for the addition of a local research staff to the Forest Department in Madras. Can you detail what the proposals actually are?—*A.* In our reorganisation scheme provision has been made for one research officer and an assistant. They will be concerned with getting all the information as regards the rate of growth and the method of regeneration of our principal species. At present we know nothing about the rate of growth. I am talking of Southern

India. We are making working plans for certain four or five different species and we have not the least idea as to the rate of growth of these species. In general, we know nothing about the best way of seasoning forest timber. We have an important working plan on the Anamalais. There are very valuable supplies of teak and other species available, and it has been really found to be quite impossible to remove the produce by means of simple country carts and so forth. We have a scheme sanctioned to run a bullock tramway up to this place and that would run to about 14 or 15 miles. That meant also the keeping of a large establishment of bullocks and cartmen and so forth where people scarcely live in March, April and May. I attempted to find out whether we could not run a light railway and so save our establishment. It is quite impossible to get any information of any sort or kind as to what the power and weight of the engine should be for that particular purpose. We had a forest Engineer who came to us as a railway Engineer and he has been dispensed with since, and he told me that he was absolutely unable to work out this problem. I asked the advice of the Superintending Engineer here and he said that it was not in his line at all. I spoke to Mr. Murray but there was nobody at all to tell us anything about it. I went home on leave and got an introduction to Sir A. Rendel's firm who are official advisers to the India Office and I put them this question and they said that they ought to be paid for this advice, and I agreed. I gave them every information on the point, our output, price of timber, etc., and asked them whether it was a paying proposition, and told them that if it was they might supply the whole of the material. They said that it was a paying proposition, and I got a little out of them as regards the weight and power of the engine that would be necessary.

Dr. E. Hopkinson.—*Q.* Do you suggest that there is a special difficulty in this problem?—*A.* The only difficulty here is that there is no advice, there is no experience of such things in Southern India and there is nobody who is capable of working out the requirements.

Q. If you had put the question to Messrs. Martin & Co., Calcutta, you would have got a full answer in a week?—*A.* Are they railway engineers? They would only give you an answer provided you would get the material from them.

Q. In the course of business they give you advice. No firm asks you to give a guarantee to purchase material from them. You must give them a preference for taking the trouble of giving you an idea?—*A.* I do not think, as a matter of fact, that their knowledge of local conditions is sufficient to give you advice from a distance at Calcutta about a light railway down here. The Government ordered the Superintending Engineer of the Public Works Department to make an inspection of the river down to Tellicherry and he seemed to say that he had no experience at all.

Q. Have the Government taken the matter up since?—*A.* That is a month ago. I consulted the Superintending Engineer on that point. He said that that was not his line at all. I may say as regards the other thing, namely the tramway that I have just spoken of, that I asked Mr. Murray whether he had got anybody in his department who would be able to advise us. He had no one whom he considered would be able to advise on that subject.

Q. Would it lead to any broad gauge railway or meter gauge railway?—*A.* Yes. It will come down to the trace of the proposed Palghat railway.

Mr. C. E. Low.—*Q.* Take this case of Schleichera seeds. I see the impossibility of the thing from the forest officer's point of view, but how do you suggest that the appointment of a commercial officer would assist the firm who wanted the seeds to get hold of them?—*A.* I do not know anything about the appointment of the commercial officer. That has not been suggested in our reorganisation proposals so far.

Q. Can you make any suggestion as to how to follow up the thing?—*A.* We would refer him to the local produce contractor and ask him to do it for him.

Q. That action is possible at present?—*A.* Yes.

Mr. A. Chatterton.—*Q.* Is it a fact that transport problems in connection with heavy forest produce such as large timber have not been properly worked out anywhere in Southern India?—*A.* I think they have been worked out as regards simple local transport.

Q. Is there any other country in the world which is extracting heavy timber from regions like those which you have got here, in an economical way?—*A.* I could not tell you.

Q. You are entirely dependent here on elaborate mechanical means of transport?—*A.* In Germany we have seen similar timber brought down by these light tramways.

Q. Are there consulting forest engineers available anywhere?—*A.* No. I do not know of anyone. I think it only requires the ordinary railway engineering knowledge.

Q. In some part of the forests you have got logs four or five feet square and 20 feet long to deal with. You have got to take them to the railway. What is the method of transport?—*A.* We have got to do with our elephants and carts.

Q. The cost is raising and it is becoming prohibitive?—*A.* Not as regards elephant work. We can always deal with that part.

Q. Suppose the forest engineer is sanctioned, could you get a man at the present time who has the necessary experience to tackle the problem at once?—*A.* In a case like that we cannot have men for every job. We must have man for road work and other things, and what I should like to do in a case like that is to refer to reliable authority and get opinion.

Q. Have you got a reliable authority?—*A.* I am telling that I could not get hold of one now.

Q. How are you going to solve the problem?—*A.* By finding out whether you can get a solution at home from somebody at home.

Q. Would it not be better to get an engineer and put him to study the problems of forest transport and to make a study of it and gradually accumulate the experience necessary to deal with it?—*A.* Yes.

Q. Do you use mechanical methods of felling timber?—*A.* No.

WITNESS No. 264.

MR. K. S. SRINIVASA PILLAI, *Tanjore, Madras.*

WRITTEN EVIDENCE.

I am acquainted with many of the industries carried on in the district of Tanjore and have myself started a weaving factory, rice mills, co-operative banks, etc.

In my opinion, India for the Indians should be the basic principle on which all industries are to be started and worked in this country. Foreigners, excepting the English, whose relationship to India is peculiar and in whose case some exceptions will have to be made, should never be allowed to own industries in India. I see no objection to our borrowing money from foreigners.

As for capital, when Japan, a country which is very much inferior to India in natural resources and other points, is able to find money for large ventures, there should be no difficulty whatever in India for capital. If with Indian capital, we cannot start a thing to-day, let us wait till tomorrow but never allow foreigners to own ventures in this country. There was a time when products such as indigo, dyes, cement, etc., were being exported from India to all parts of the then civilised world. Now Japan in the east, and European countries in the west are trying to dump such products upon the Indian market. India, the original home of the sugar-cane, is now importing sugar worth not less than 10 crores of rupees per annum. Cotton-ware, which we should supply to other countries, is being imported on a large scale. The reputation of the fineness of the Indian muslins of old shows that the opinion about the unsuitability of India for the manufacture of higher counts is not correct. Indian resources have not been tapped as they should have been and no experiments worth the name are being made. Ship-building was, at one time, a thriving industry in India and the Indian navy was counted the best in the world. Europeans had to learn ship-building from the Indians and the Sultan of Turkey had his ship built in India.

At present experts in different industries will have to be engaged from foreign countries till the Indians qualify themselves. Indian workmen are intelligent. There are hundreds of rice-mills in the Tanjore district of which the machinery is in the sole charge of Indian workmen. People who begin life as day-labourers soon become efficient drivers.

High class scientific training grounds should be opened in India for Indians in more than one centre. With regard to the particular subjects in which instructions are to be given we should leave it to time to decide. Now we may begin with indigo dyes, sugar, cotton and so forth. The officers of the Department of Industries do not freely move with the people. As long as Mr. Chatterton was here, things were quite different. There is a good deal in the selection of the personnel. Government should look to results and not to reports which say that Indian youths are incompetent to receive instructions. This shows rather the inefficiency of the teacher.

As for drawing capital to a venture there would be no difficulty. In the past, some men started business who were either dishonest or inefficient or both, which ended in fiasco. People having lost by such movements naturally keep off from them. If the right men are in charge of the work and people made to understand it, the difficulty of capital will disappear.

To improve the labourers' efficiency the following things will be useful:—

1. Firm opening a book for recording suggestions for improvements in any direction to be made by the subordinates of the firm including workmen and rewarding them according to the nature of the suggestion.
2. A portion of the annual profits should be allotted to be divided among them.
3. For good work done, subordinates should be made partners.
4. Vacancies should be filled up as far as practicable from within.

Indian Institute of Science

5. Sometimes workmen may be sent for instruction at the cost of the firm.

6. There should be a Board for disposing of appeals by workmen who should be invested with such rights.

Industrial schools should be under the control of the Department of Industries but the present departments should be very much improved.

In Tanjore there are many more rice-mills than are necessary.

Government aid may be given to new industries in any of the modes mentioned in question 5 but the third mode should not be adopted except in the case of railways to be newly started.

Accurate budgets for the new ventures can never be expected. Unexpected difficulties crop up and the expected difficulties vanish. Large powers should be given to men in charge of a work in cases where repairs and other things are to be made on the spot immediately without the previous sanction of the Government where they have connection with the business. Services of Government experts will have to be lent in some cases without any conditions and in other cases according to the nature of the case.

If industries require land, which they cannot acquire after reasonable efforts, Government may give them aid in some special cases.

I have found the Indian Trade Journal to be of little use.

The issue of special monographs, etc., I have known to have done great good in agricultural matters.

Railway transport facilities are insufficient in the Tanjore district.

NOTE.—*Witness did not give oral evidence.*

WITNESS No. 265.

Memorandum presented to the Indian Industrial Commission by the Council of the Indian Institute of Science.

WRITTEN EVIDENCE.

The institute contains at present the Department of Electrical Technology, the Department of General and Organic Chemistry and the Department of Applied Chemistry.

The Department of Electrical Technology provides an advanced course of instruction in the subject which normally extends over three years and is only suitable for students who have already graduated and possess considerable knowledge of Higher Mathematics and Physics. It also affords facilities for carrying out original investigations to students who have undergone such a course. It has been very successful in turning out a considerable number of trained electrical technologists who have up to now found little difficulty in securing suitable employment. The Council make no suggestions for the development of this department and consider that no radical change need be discussed unless the suggestions in the matter of large chemical developments mentioned below prove feasible.

There are no indications of any pressing need for any other departments except such as are chemical in nature and the Council consider that the buildings, organisation and present chemical staff might well form the nucleus of a large chemical institute dealing with chemistry in all its applications.

The present Department of General and Organic Chemistry affords ample opportunities for students desirous and capable of undertaking research on purely scientific lines and may well continue so to do. There is however no general course of instruction similar to the courses given in those University colleges where advanced chemistry finds a place in the curriculum. The instruction given takes the form of assistance to individual workers, with meetings of the staff and students at intervals to read and discuss some particular paper.

The laboratories have in the past been open to teachers of chemistry or to chemists whatever the nature of their work for the purpose of studying for short periods up-to-date methods or other special work.

The Department of Applied Chemistry is doing the kind of work for which there seems to be the greatest demand and as the Department of General and Organic Chemistry settled down to regular work after the initial stages of organisation the tendency has been to deal more and more with problems having a practical application and thus to some extent it has become another Department of Applied Chemistry.

This is the kind of work which has presented itself and there is no doubt it is work which must be undertaken somewhere on a very much larger scale than at present. It is suggested that the institute might well develop on these lines.

The Council would ask the Commission to recommend such a development and the provision of public funds for the purpose.

The site affords ample accommodation for all the necessary buildings. There is any amount of work to be done, and it is only necessary to secure the funds.

The Commission is enquiring about the system of referring local problems to the Imperial institute, but it seems clear that the chemical side of the majority of these could be suitably dealt with at this institute if so developed.

Two further questions arise from the preliminary note issued by the Commission.

Firstly, should the institute be general in its interests or be confined to limited groups of related subjects?

The Council consider that the various branches of chemistry offer a sufficiently wide field for any one institute and that more suitable arrangements could be made for the direction of such specialized work than would be possible in the case of an institution dealing with a number of unrelated or distantly related subjects; while on the other hand the Council feel convinced that the bringing together at the same centre of a large number of experts working at various branches of one main subject should afford the best chance of co-operation and stimulus; it is indeed in their opinion probable that the isolation hitherto experienced by many scientific workers in India has been one of the chief reasons of the comparatively disappointing results.

Secondly, should the institute be Imperial in its interest or be maintained as a Provincial institution?

It is obvious that a large number of the most important questions to be dealt with—for instance, those relating to the oil industry with all its subsidiaries—are for the most part common to all provinces, and much waste of effort might be prevented by a central institution; while all would share equally in the results, given a suitable system of deputing experts and students to work on the spot and arrangements for widespread publication.

There are no doubt problems whose importance is more local—as for instance, the manufacture of sandalwood oil or other questions dealing with localized raw materials—but the scientific work connected with these would be better carried out in a large scale institution provided with experts dealing with numerous branches, while further developments might be looked for in factories erected in the centre of the particular industry, such factories having specially equipped, though not necessarily large, laboratories attached to them. Members of the staff might be deputed when necessary to direct any special work carried on in such laboratories.

It will certainly be urged on the other hand that local interests would be served somewhat in proportion to their distance from the central institution and also that work would be more likely to be brought to a local institution. There may be some truth in these arguments but the matter resolves itself largely into a question of the funds available. The Council think it unlikely that more funds will be available than would suffice for one chemical centre with a sufficiently large and varied staff together with laboratories and equipment to secure that all the various aspects of any problem, both scientific and technological, could be dealt with on the spot and with such an income as to make feasible (1) the entertainment of a Director of such high qualifications that he might be expected to command the respect of the entire staff and be in a position to arrange for the necessary co-operation, (2) the maintenance of a thoroughly well-equipped workshop for chemical engineering with sufficient staff to serve the needs of all the departments, and (3) the possession and upkeep of a library as complete as it is possible to make it in all matters relating to chemistry.

Any attempt to equip a number of institutions in these respects would entail unnecessary extravagance.

An institution such as the Council have in view might well absorb in its staff practically all the chemists at present in Government employ, their services or those of other members of the staff being "lent" for definite or indefinite periods as required. Whether chemists attached to colleges should be included would be a matter for special consideration; there would however be no insuperable difficulty in applying this system to teaching posts also.

If the institute were supported entirely or even to a much greater extent than at present by public funds it may be assumed that some change in the present organization and system of control might be considered desirable or even necessary; the Council however trust that any changes which might be introduced would not impair the present elasticity in the system of control.

To sum up the Council are convinced that the institute should form the nucleus of a large central institution devoted to chemical research in all its branches and they would gladly undertake to formulate a detailed scheme on learning that the main proposal is acceptable to the Government and the extent to which financial assistance would be forthcoming.

SIR ALFRED G. BOURNE, K.C.I.E., D.Sc., [illegible] Science, [illegible]

WRITTEN EVIDENCE.

NOTE.—Witness gave oral evidence which is confidential. The following statement was submitted by him after his oral examination.

INDIAN INSTITUTE OF SCIENCE, BANGALORE.

List of present students.

Names.	Whence coming.	Academic qualifications, etc.	Remarks.
1. Mr. C. P. Chowna ..	Bombay ..	B.A. (Bombay)	Electrical Technology.
2. ,, M. R. Raja Rao ..	Madras ..	B.A. (Madras)	Do.
3. ,, M. V. Pant Vaidya.	Indore ..	B.Sc. (Allahabad) ..	Do.
4. ,, K. M. Dordi ..	Bombay ..	B.Sc. (Bombay)	Do.
5. ,, P. B. Kale ..	Do. ..	Do	Do.
6. ,, H. B. Warden ..	Do. ..	B.A., B.Sc. (Bombay) ..	Do.
7. ,, S. B. Deshpande ..	Do. ..	B.A. (Bombay)	Do.
8. ,, S. M. Gole ..	Indore ..	B.Sc. (Bombay)	Do.
9. ,, B. Venkatarama Sastri.	Bangalore ..	B A. (Madras)	Do.
10. ,, S. Chinnadorai .	Madras ..	B.A. (Hon.) (Madras) ..	Do.
11. ,, K. C. Sanyal .	Bengal ..	B.Sc. (Calcutta) . .	Do.
12. ,, P. K. Ghose ..	Do. ..	Do. ..	Do.
13. ,, S. K. Bose ..	Bengal ..	Do.	Do.
14. ,, B. K. Ramprasad ..	Bangalore ..	B.A. (Hon.) (Madras) ..	Do.
15. ,, K. K. Nanavati ..	Bombay ..	M.A., B.Sc., (Bombay) ..	General and Organic Chemistry.
16. ,, G. R. Paranjpe ..	Do. ..	B.Sc. (Bombay)	Do.
17. ,, K. S. Dheerender Doss.	Bangalore ..	B.A. (Madras)	Do. Mysore Government Scholars.
18. ,, K. Umanatha Rao	Do. ..	Do.	Do.
19. ,, B. S. Ayyangar ..	Do. ..	B.Sc. (Bombay)	Do.
20. ,, Y. D. Wad ..	Bombay ..	M.A., M.Sc. (Bombay) ..	Applied Chemistry.
21. ,, A. G. Gokhale ..	Do. ..	M.A., B.Sc. (Bombay) ..	Do.
22. ,, K. G. Laiwala ..	Do. ..	B.Sc. (Bombay) ..	Do.
23. ,, D. N. Muthyala ..	Hyderabad (Deccan).	Ph.C., M.P.S.	Do. Hyderabad Government Scholars.
24. ,, H. Mehdi Hassan.	Do.	Diplomate of Agriculture (Oxon).	Do.
25. ,, H. Habib Hassan .	Do.	L.Ag. M.R.A.S. (Punjab).	Do.
26. ,, N. Inuganti ..	Do.	G.M.V.O.	Do.
27. ,, S. R. Bhate ..	Do.	B.A., B.Sc.	Do.

The following are permitted to work in the General and Organic Chemistry Laboratories.

28. Mr. K. S. Paramesvara Ayyar	Mysore Tannery, Limited.	B.A. (Madras)	Working on chrome leather tan liquors and leathers.
29. ,, B. N. Venkataramayya.	Mysore Geological Department.	Do.	Working on Mysore materials suitable for furnace linings.
30. ,, B. S. Balaji Rao *	Do.	Do.	Working on Mysore alkaline earths.

List of past students of the Department of General and Organic Chemistry.

1. Dhavale, Bhaskar Balvant.	Kolhapur ..	M.A. (Bombay)	Went to London for undergoing a course in preparation of tannin extracts. Afterwards going to America.
2. Bhagwath, Narayan Balaji.	Indore ..	Do.	Working in Oil Company, Bombay.
3. Gadre, Shankar Trimbak	Poona ..	Do.	First Chemical Assistant in the Government Technical Laboratory, Cawnpore.
4. Gupta, Nalini Mohan ..	Bengal ..	M.Sc. (Calcutta)	Chemist in the Sanitary Commissioner's Laboratory, Calcutta.
5. Mehta, Bhaishand Anupchand.	Rajkote ..	M.A. (Bombay)	Department of Industries, Junagad.
6. Pal, Gostabehari ..	Dacca ..	M.Sc. (Calcutta)	Agricultural Department, Dacca College.
7. Ray, Rames Chandra ..	Bengal ..	Do.	Professor of Chemistry, Patna College.
8. Sabiar, Hormaji Kharshedji.	Bombay ..	M.A. (Bombay)	Professor of Chemistry, St. Xavier's College, Bombay.

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* Left in January 1917.

[illegible]	[illegible]	[illegible], etc.	Remarks
9. Shankara Rao, B. [illegible]	Bangalore	M.A. ([illegible])	Assistant Chemist in the Agricultural Department, Mysore State, Bangalore.
10. Kanga, Dorab Dinshah.	Bombay	M.A. (Bombay)	Professor of Chemistry, Elphinstone College, Bombay.
11. Advani, Paramanand Mewaram.	Sind	M.A., B.Sc. (Bombay)	Lecturer, Sind College.
12. Ashar, Haridas Vallabhdas.	Bombay	B.Sc. (Bombay)	Worked for three months only and then left.
13. Banker, Shankarlal Ghallibhai.	Do.	M.A. (Bombay)	Intends starting factory for preparing tannin extracts, at present has small private laboratory.
14. Garlapury Sastri, S.	Mysore	B.A. (Madras)	Obtained scholarship from Mysore Government. Went to University College, London, is at present engaged in a Soap Factory, Nottingham.
15. Kolhatkar, Gopal Balkrishna.	Poona	M.A. (Bombay)	Professor of Chemistry, Fergusson College, Poona.
16. Shah, P. G.	Agra	M.A., B.Sc. (Bombay)	Professor of Chemistry, Foreman Christian College, Lahore.
17. Narasimhaswami, M. V.	Madras	B.A. (Madras)	Worked for three days only.
18. Lakhumalani, Jamiatri Vishindas.	Sind, Hyderabad.	M.Sc. (Bombay)	Has applied for post as Research Chemist in United Provinces Rosin Factory.
19. Sathaye, Vinayak Ganesh	United Provinces	M.A. (Bombay)	At present making experiments on the manufacture of Thymol, intends starting a factory.
20. M. R. Ananthanarayana Ayyar.	Madras	B.A. (Madras)	Taken post in the Mysore Geological Department.
21. Lakshman Rao, P.	Hyderabad	Do.	Worked for one month only.
22. Rajaraman, V.	Madras	Do.	Worked for one day only.
23. K. Sitarama Ayyar	Travancore	M.A. (Madras)	Lecturer in Chemistry, Maharaja's College, Trivandrum.
24. A. J. Desai	Bombay	B.Sc. (Bombay)	Assistant to the Agricultural Chemist, Central Provinces.
25. H. B. Shroff	Do.	Do.	Doing business in Cotton Mills.

All the above students had taken Chemistry as the chief subject for their degree before admission to the Institute.

List of past students of the Department of Applied Chemistry.

1. Mr. Syed Ali Jan Rizvi.	Agra	B.A., B.Sc. (Allahabad).	....
2. ,, Dadachanji, H. K.	Bombay	B.Sc. (Bombay)	Studying in Berlin University, Germany.
3. ,, Jagtiani, J. L.	Karachi	B.Sc. (,,)	....
4. ,, Pandya, K. C.	Bombay	M.A. (,,)	Lecturer in Chemistry, St. John's College, Agra.
5. ,, Bhargava, M. P.	Gwalior	B.Sc. (Allahabad)	....
6. ,, Dhavan, R. N.	N.W.F. Provinces.	B.A., M.Sc. (Punjab)	Professor of Chemistry, Patiala College.
7. ,, Dwarka Prasad	United Provinces.	B.Sc. (Allahabad)	....

List of past students of the Department of Electrical Technology.

1. Mr. Ayya, D.V.	Bangalore	L.E.E. (Bombay)	Studying Electrical Engineering in America.
2. ,, Chakravarthi, P. C.	Madras	B.A. (Madras), L.E.E. (Bombay).	Electrical Engineer, Tata Hydro-Electric Works, Kapoli
3. ,, Desai, N.B.*	Baroda	L.E.E. (Bombay)	Imperial Electrical Stores, Bombay.
4. ,, Kothawala, K. R.*	Do.	....	Do. do.
5. ,, Mistry, N. R.	Bombay	B.A., B.Sc. (Bombay)	Tata Hydro-Electric Works, Bombay.
6. ,, Parikh, J. M.	Do.	L.M.E. (Bombay)	Kala Bhavan Institute, Baroda.
7. ,, Ramaswami, S.M.*	Bangalore	....	Government Sandal Oil Factory, Bangalore.
8. ,, Subba Rao, P.	Madras	B.A. (Madras)	Siemens Brothers, Madras.
9. ,, Tiwari, R. N	Cawnpore	B.Sc.	Tata Hydro-Electric Works, Bombay.
10. ,, Bhatt, M.H.	Surat	L.M.E. (Bombay)	Electrical Department, Boroda.
11. ,, Khambati, N. R.	Bombay	B.A. (Bombay)	Electric Tram Company, Bombay.
12. ,, Mehta, C. N.*	Do.	Do.	Advance Mills, Ahmedabad.
13. ,, Menon, A. K.	Malabar	B.A. (Madras)	Electrical Department, Hyderabad, (Deccan).
14. ,, Mowdawalla, F.N.	Bombay	M.A., B.Sc. (Bombay)	Engineering College, Madras.
15. ,, Ramaswami Ayyangar, T.K.	Madras	B.A. (Madras)	Electrical Department, Bombay Public Works Department.
16. ,, Ghose, K.	Bengal	B.Sc. (Calcutta)	Gone to England on State Scholarship.
17. ,, Tirunarayanan, M.B.	Madras	B.A. (Madras)	Cape Copper Company, Chota Nagpur.
18. ,, Vaidyanathaswami, R.*	Do.	....	Do. do.

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* Those marked with an asterisk were advised not to continue their studies at the Institute, as they were found unable to make satisfactory progress.

List of other workers.

Name.	Whence coming.	Department.	Remarks.
1. Mr. B. M. Mukherjee ..	Lecturer, Roorkee College	Applied Chemistry.	Gave instruction to students in Glass blowing.
2. „ J. Chakrabhorty, B.A.	Deputed by Mysore Government.	Do.	Soap Expert deputed by Mysore Government. Now Soap Expert to Government of Baroda.
3. „ K. Padmanaba Pillai.	Do	Do.	Experiments on dyes.
4. „ A. K. Menon, B.A.	Madras Fisheries Department.	Do.	Purifying Fish oils. Assistant to Sir F. Nicholson.
5. „ G. A. Mahamadi, B.A.	Deputed by Mysore Government.	Do.	Soap making Expert, paid by Mysore Government.
6. „ C. S. Ramachandra Ayyar, B.A.	Deputed by Madras Government.	Do.	Pencil making.
7. „ C. S. Narayanaswami Ayyar.	Alchemist from Tanjore.	Do.	Paper mill Agent, Shiyali.
8. „ N. Sarangdhar, M.Sc.	Bombay	Do.	Professor of Chemistry, Wilson College, Bombay.
9. „ N. Venkataranga Ayyangar, B.A.	Mysore (deputed by Mysore Government).	General and Organic Chemistry.	Sandalwood distillation. Now employed as Chemist in Government Sandalwood Oil Factory.
10. „ P. Subrahmanya Ayyar, M.A.	Madras	Do.	Lecturer in Chemistry, St. Joseph's College, Trichinopoly.
11. „ G. Subrahmanya Ayyar, B.A.	Deputed by Mysore Government.	Do.	Sandalwood Oil Factory, now Chemist in Government Sandalwood Oil Factory.
12. „ B. Rajagopaul, B.A.	Do.	Do.	Do. do.
13. „ Dr. Paul Bruhl, Ph.D.	Calcutta	Do.	Engineering College, Sibpur. Carried out some analyses of minerals.
14. „ W. M. Gimson, Esq., R.E.	....	Do.	On distillation of lignites.
15. Dr. F. Marsden, Ph.D., M.Sc.	....	Applied Chemistry.	On indigenous dye stuffs.
16. Mr. K. Parthasarathi, B.A.	Deputed by Mysore Government.	General and Organic Chemistry.	Sandalwood distillation. Now Chemist, Government Sandalwood Oil Factory.
17. „ C. H. Vora, M.A., B.Sc.	Baroda	Electrical Department.	Principal, Kalabhavan Institute, Baroda.

WITNESS NO. 267.

DR. A. HAY, D.Sc., M.I.E.E., *Professor of Electro-technology, Indian Institute of Science, Bangalore.*

WRITTEN EVIDENCE.

Technological institutions.

Questions 24 and 71 may be conveniently considered together.

Technological research would be greatly stimulated by more intimate contact between manufacturers or intending manufacturers on the one hand, and members of the staffs of institutions capable of carrying out researches on the other. Manufacturers would probably be glad to avail themselves of any opportunities which might be afforded them of submitting technical problems for investigation to research institutions, and members of such institutions would be equally glad to be kept in close touch with the special problems which interest manufacturers. Close co-operation of this kind would react beneficially on both the parties concerned. It would tend to prevent stagnation on the part of the manufacturer, and would make the investigator feel that the problems on which he is engaged are of vital importance to industry. It seems, however, unlikely that close contact between the manufacturer and the investigator could be initiated without a stimulus from some external source. I therefore wish to suggest the desirability of establishing some definite system which will have for its object the bringing about of much closer co-operation than exists at the present time between manufacturers and investigators, and which will form a permanent connecting link between them. A department established on the lines suggested might be termed an "Industrial Intelligence Department" and might consist of the Directors of Industries in the different Provinces, who could meet at intervals at a central office for comparing notes and discussing the future policy of the Department.

Imperial Departments. Hydro-electric power surveys.

I wish to group questions 64 and 102 together.

It will be readily admitted that cheap power provides an important stimulus to industrial development, and any schemes intended to further such development must necessarily take into account the fundamental problem of power generation. It is also well-known that although hydro-electric power is by no means always the cheapest form of power, yet, given favourable conditions, it easily outdistances all its rivals. This is well shown by the large hydro-electric plants of Norway, which are, in some instances, able to generate a horse-power year at the extremely low cost of 35 shillings; whereas, in the most up-to-date modern factory employing steam plant, the cost would be at least £6 (assuming pre-war price of fuel). There is another feature connected with hydro-electric power which differentiates it sharply from power obtained by the use of heat engines. This feature is the financial stability of hydro-electric as compared with heat engine plants. The cost of power generation by means of heat engines is largely influenced by the cost of the fuel—a fact which introduces an element of uncertainty into the cost of this mode of power generation. Again, a failure of the fuel supply will completely cripple a heat engine plant. Lastly, the steadily increasing cost of fuel will in course of time make it increasingly difficult for heat engine plants to produce power at a reasonable cost. These disadvantages are entirely non-existent in the case of hydro-electric plants, which may be regarded as constituting perennial sources of power. Although the day when serious shortage of fuel will necessitate a complete regrouping of the present industrial centres may be regarded as still far distant, the earliest possible utilisation of the available water power of a country is a matter of primary importance to future generations. Every new hydro-electric plant which comes into existence has the effect of preventing an avoidable increase in the rate at which our fuel resources are being used up. It is no exaggeration to say that the water power of a country is one of its most valuable assets, and for this reason it seems desirable that the State should devote to it that degree of attention which is warranted by a matter of the highest national importance. I would therefore suggest that a very complete survey be made of the available water power of India, and that in addition to determining the maximum amounts available, rough estimates be prepared of the probable cost of development. Information of this kind should be given the widest publicity, and should be freely placed at the disposal of intending manufacturers, who should be encouraged in every possible way to utilise hydro-electric power in preference to power derived from heat engines. I believe this matter to be of sufficient importance to warrant the establishment of a special hydro-electric power department. Should Government decide, as suggested in question 7, to adopt the policy of establishing pioneer factories on any considerable scale, such factories might conveniently be either grouped in the immediate neighbourhood of hydro-electric generating stations, or in industrial centres supplied with hydro-electric power.

Co-ordination of research.

With reference to question 74, regarding the adoption of restrictive or preventive measures intended to cope with the apparent waste of effort involved in cases where two or more investigators happen to be working at the same subject in different places. I am of opinion that such measures could only be used with the utmost caution, as they are likely to be productive of more harm than good. Both pure science and its industrial applications present numerous instances where either the actual experimental results or the estimate of their commercial or industrial value required drastic revision. In very few cases is it safe to assume that finality has been reached, and the same ground may frequently be very profitably worked over independently by two or more individuals. It is, however, desirable that each worker should be kept fully informed of what is being done by his fellow-workers elsewhere.

Q. 76.—The addition of a section of mechanical and electrical engineering to the existing sections of the Science Congress would, I think, give it greater facilities for stimulating industrial development.

ORAL EVIDENCE, 13TH FEBRUARY 1917.

NOTE.—The revised list of past and present students of the Institute will be found in the written evidence of witness No. 266.

Dr. E. Hopkinson.—*Q.* We all have had the advantage of going over your department and seeing to some extent what is actually going on there. We should like to know, if you can tell us very briefly, and not in too technical a form, what has been the character of the researches and the experimental work which has been done in your department?—*A.* The experiments which have been carried out in the electrical department are mainly concerned with questions connected with the design and behaviour of electrical plant. Recently we have been carrying out researches on the behaviour of an alternator or rotary converter during the synchronisation period, and at present we are engaged on an investigation of the magnetic flux distribution in the core of a transformer. Speaking generally practically all the researches that have been carried out have had reference to generating and transforming plant, and motors.

Q. Has the desirability of particular researches originated with you or have they been suggested by anything brought to you by students or the manufacturers of plants?—*A.* So far all the researches have been originated by myself. At the present time research work is being done almost entirely by students under my direction.

Q. So that in that respect the institute has not quite followed the lines which you think it should take up in the future judging from your evidence?—*A.* Not entirely.

Q. The whole idea is that the institute should meet the research needs of maker, manufacturer and user?—*A.* Yes.

Q. The time has not yet been ripe for that?—*A.* The time is not yet ripe in my department, at any rate, and one fairly obvious reason is that the manufacturer of electrical machinery in India is non-existent at the present time.

Q. He is absolutely non-existent?—*A.* Absolutely non-existent, although the repairing of machinery is done to a certain extent.

Q. You could not say that the work done in your department has nothing to do with the repairs of electrical machinery?—*A.* No.

Q. Looking forward to the future do you anticipate that there may be much brought before you for research by users and makers?—*A.* Well, I think that it is quite possible that problems may arise in connection with the transmission of power, such as problems relating to the design and methods of testing high-voltage insulators, which may possibly be referred for solution to the Indian Institute of Science. I think there is that possibility.

Q. Has your department done any work in the way of standardizing or testing instruments?—*A.* No. There does not seem to have been any demand so far for that kind of work, and personally I have made no effort to secure work of this kind because I do not regard that as important as other kinds of work that we are doing in the department.

Q. I understand, but I may not be correct in it, that any standardization of electrical instruments has now to be done at home?—*A.* We have standardizing laboratories in Calcutta and Bombay.

Q. Which laboratories are you speaking of?—*A.* The Government laboratories.

Mr. C. E. Low.—*Q.* There is a laboratory at Sibpur where they do a certain amount of testing. Now they do it at Alipur. But they do not do any standardization.

Dr. E. Hopkinson.—*Q.* So far as I know they did nothing in the way of electrical instruments. Is it the same place as that which Mr. Low is referring to?—*A.* I rather think it must be. To my knowledge there are two places in India where instruments may be tested. There is one in Calcutta and one in Bombay, and both places are managed by the Government of India.

Q. You cannot give us the proper designation of the place?—*A.* I cannot give you the official designation of the place.

Q. And you have never sent any instruments yourself?—*A.* No.

Q. Have you got the apparatus necessary for testing and standardizing?—*A.* Yes.

Q. You are familiar of course with the testing arrangements at the National Physical Laboratory at home. Could you carry out in your laboratory the same work?—*A.* We could.

Q. You do not think that there is any immediate need for it?—*A.* We have had no application for work of that kind up to the present.

Q. You have not been invited to do it?—*A.* We have not been invited to do it. Under present conditions we could not cope with any large volume of work of this description. We have got the instruments for it but we have not got the time.

Q. Would the work be largely done by students under supervision?—*A.* It would be

Q. And that is one of the best forms of instruction that you can give to the students?—*A.* If we do not give them too much of it. We could not for example keep a student doing nothing but testing during an entire term.

Q. Sir Alfred Bourne has been good enough to give us a list of the present and past students. Have you seen the list so far as you are concerned?—*A.* It only reached me last night.

Q. Will you look at the first page where the present students have been given. I see that they are fairly well-distributed. They come for the most part in your case and also in other cases, from Bombay, having taken the degree of Bombay. I want particularly to ask you whether you find those students coming from Bombay are more highly qualified than others for taking advantage of the work done here?—*A.* It is a matter of some difficulty to institute a comparison between the graduates of the Bombay University and those of other Indian Universities. The difficulty arises in this way. If you look at the list you will find that among the Madras graduates we have two Honours graduates and it is almost impossible to compare the Honours graduates of one university with the ordinary graduates of another university. I should prefer not to make a definite statement with regard to the standard of education.

Q. It would be convenient if you could arrange the list in order of merit?—*A.* Generally speaking my impression is that far more depends on the abilities of the man than on the particular university at which he has been trained. The university may do a good deal but a lot depends on the natural abilities of the man.

Q. Can you supplement this list prepared by Sir Alfred Bourne with your opinion upon the relative merits of the students and upon how much of that merit you would attribute to natural qualifications, how much to the exertions of the student while here and how much to the university from which he came. I have not expressed myself quite as I should have liked but no doubt you understand what I want to arrive at?—*A*. I am afraid I am hardly prepared to do that. It is a matter of very considerable difficulty. If the total number of students were large it would be possible to make a definite statement but with only a dozen students altogether I think it is almost impossible. It would not be possible to draw any safe inferences.

Q. What we want to understand is to what extent the universities in India are able to turn out students fully qualified to take advantage of the work done here. That is a point on which we want assistance and we want to go a little further and find out if the student turned out by any university has characteristics peculiar to that university. Apart from the universities I think there is a general impression that the "Victoria Jubilee Technical Institute" is doing extremely good work. We want to know if you have found that impression to be justified?—*A*. My impression is that it is doing most excellent work of its kind. The work that we are doing is of a different kind and there can be no question of competition between the two institutions. The scope of the instruction and the nature of the instruction are entirely different in the two cases.

Q. You have had students from the Victoria Technical Institute?—*A*. In the early days, among the first batch of students, we had three or four. They had taken a technical course at the Victoria Technical Institute. Since then we have found it impossible to admit any more students from the same institution on account of the fact that their knowledge of higher mathematics is hopelessly inadequate. It was an experiment.

Q. You have described the sort of research work going on here. Would you say it was of much the same kind as the research work being done in the home universities as distinguished from that which is going on at the National Physical Laboratory or in other public institutions frequently carried on under the auspices of Government?—*A*. It is very largely of the same type as the research work that is going on in the home universities.

Q. Whatever may be the case in your department I understand that the general policy of the institute is to leave that sort of work as much as possible to the universities and to take up the sort of work that has been done at home by the Institution of Mechanical Engineers and Civil Engineers and so on?—*A*. It would be almost impossible for us to engage in such work as the National Physical Laboratory has been doing, because of the amount of concentration of effort and the demands on our time that it would involve. It would be almost impossible for the head of the department to devote himself to such things under present conditions. I should like to explain that although I am looking forward in the future to being able to make the electrical department more and more a department for research students, up to the present it has largely been a teaching department and the researches that have been carried out have been done in spare moments as it were.

Q. To what extent do you devote your time to teaching?—*A*. Well at present the bulk of my time is devoted to teaching. I have got three hours lecturing to do on some days and frequently without any break and then in the afternoons I have to organise and look after the laboratory work.

Q. How has that come about?—*A*. The way it has come about is this. When the department was first started it was hoped that we should be able to get students who would be able to start research work soon after joining the department. We found that such students were not available in India, and it was a choice between either not taking any students at all, or else admitting them and giving them the necessary training for enabling them to engage in research afterwards.

Q. In that sense the establishment of the department has been a failure?—*A*. I believe that it will be all right in a short time, when some of the technical and engineering colleges in India begin to send out their students. For instance, there are the Engineering Colleges in Poona and Madras. I hope that those colleges will in time be able to supply us with students fit to take up research work. Up to the present we have been forced to give them the necessary training ourselves.

Q. Will you turn to the fifth page of the statement before you. There is an interesting column showing what past students are doing now. I should like to know whether you keep in touch with them and are satisfied for the most part that they are doing good work and doing credit to the time spent here. Can you say so definitely?—*A*. Yes. They write to me occasionally and in some cases I have opportunities of ascertaining from their superior officers how they are getting on, and the replies received have in most cases been gratifying.

Q. Have most of them got good appointments from the financial point of view?—*A*. Most of them are at present drawing salaries ranging from 100 to 200 rupees a month. Some of them have been fortunate enough to start on Rs. 200 a month. Others have had to be content with lower salaries, but in a comparatively short time some of them have been successful in obtaining an increase. I may also say that some private firms refuse to offer any salary and they simply take the man on probation, and after three or four months of probation they offer him a salary.

Q. Would you describe any of these as failures?—*A*. There is only one perhaps whom I should regard as a partial failure, owing mainly to his weak health.

Q. Have any of these applied to you to recommend them?—*A*. In some few cases.

Q. Not in general?—*A*. Not in general. The initiative has had to be taken by myself. In one or two cases I have been asked to supply men with the same sort of training as those whom the firm had previously engaged.

Q. To pass to another matter. I presume that you are allowed to undertake private work independently of your professorship? To what extent have you done so?—*A*. Yes. To a limited extent. Quite recently, I have felt it my duty to refuse an offer which I had because I could not spare the time for the purpose.

Q. What is the nature of the work that you have done?—*A*. The only work that I have done in the capacity of Consulting Engineer has been for the Tata Hydro Electric Power Supply Company in the matter of carrying out tests and reporting on certain motors owned by the company.

Q. You have not done anything in the nature of research?—*A*. Not for any private firm.

Q. I should like to ask you to tell me briefly what your academic history has been before you took up the professorship here?—*A*. The first appointment I had was that of demonstrator of Engineering at the Nottingham University College. The next was a lectureship on Electro-technics at Liverpool University College. My next appointment was a professorship of electrical engineering at Coopers Hill.

Q. How long were you at Coopers Hill?—*A*. About two years I was permanent professor and another year I was visiting professor.

Q. Of what university are you a D.Sc.?—*A*. Edinburgh.

Q. Have you had any works experience?—*A*. I served a complete apprenticeship with a Glasgow electrical engineering firm.

Q. What firm?—*A*. McWhirter Fergusson & Co.

Q. Will you turn to your printed note. I do not quite understand what you mean by the Industrial Intelligence Department, referred to in the first paragraph which is to consist of the Directors of Industries in the different provinces. Is that a department to be a go-between between the Institute of Science and the industries?—*A*. My idea was that the Directors of Industries would have a knowledge of the manufactures of their respective districts, and they would also be in a position to form an opinion regarding the relative importance of any researches that it might appear desirable to carry out. The men at the technical research institutions would not have knowledge of this description and by the formation of a department of this kind, called the Industrial Intelligence Department, the research men could be kept informed of the needs of the manufacturers. That would simplify matters to a considerable extent.

Q. Would you not much prefer to be in direct communication with any one who wanted any assistance from your department?—*A*. I should. But it appears to me that the Director of Industries who goes about the country a good deal and gets to know all the manufacturers and talks to them would probably be in a better position to elicit information from them than a man in a research institution whose time is largely devoted to his researches and who has not the opportunity of coming into contact with the manufacturers. Suppose you had a Director of Industries who visits an important manufacturing centre. He talks with the manufacturers there. They state their difficulties to him and tell him that they would like to have investigations carried out and the Director may put them into touch with a suitable investigator. The manufacturer and the actual investigator are not likely to be brought into direct contact with each other. That was my idea.

Q. In the last paragraph of your note you say 'The addition of a section of electrical and mechanical engineering to the existing sections of the Science Congress would, I think, give it greater facilities for stimulating industrial development'. Does the Science Congress stimulate industrial development at present?—*A*. To my knowledge it does not. It is entirely divorced from industrial development, so far as I have been able to form an opinion.

Q. Do you mean to say that it is devoted to theoretical subjects?—*A*. Yes, with the exception perhaps of the section of agriculture.

Sir D. J. Tata.—*Q*. You say in the first paragraph of your written evidence, 'I therefore wish to suggest the desirability of establishing some definite system which will have for its object the bringing about of much closer co-operation than exists at the present time between manufacturers and investigators, and which will form a permanent connecting link between them.' Is that the object that you have in view in connection with the formation of the Industrial Intelligence Department?—*A*. Yes.

Q. About hydro-electric power surveys, you say "This is well shown by the large hydro-electric plants of Norway which are in some instances able to generate a horse power year at the extremely low cost of 35 shillings, whereas in the most up-to-date modern factory, employing steam plant, the cost would be at least £6 assuming pre-war price of fuel." Where did you get this figure?—*A*. I got it from various published statistics regarding steam plants and hydro-electric plants.

Q. You mean £6 per year per horse power?—*A*. Yes.

Q. And anything below that would be unattainable?—*A*. Yes.

Q. Later on you say "The failure of the fuel supply will completely cripple a heat engine plant. The steadily increasing cost of fuel will in course of time make it increasingly difficult for heat engine plants to produce power at a reasonable cost." We have had heat engine plants for a number of years and our experience has not been that?—*A*. I was not contemplating the present time nor the immediate future, but rather the distant future.

Q. All that you mean is that it is getting dearer and dearer?—*A*. Yes. We shall go on for a considerable time. But ultimately we shall be pulled up.

Q. You suggest that a very complete survey be made of the available water power of India. By whom should this survey be made?—*A*. By the Government of India I am suggesting the establishment of a special department for the purpose.

Sir F. H. Stewart.—*Q*. If that kind of thing were done by Government, who would do it? Do you think that the Government officials would do it?—*A*. I think it could be done.

Sir D. J. Tata.—*Q*. Don't you think it would be better to have it carried on by private enterprise, provided it is carried on in a satisfactory manner?—*A*. Yes. I think that private firms and private individuals should be given every possible encouragement in that direction.

Q. You think they should be given encouragement?—*A*. And help if necessary, and all possible facilities.

Mr. C. E. Low.—*Q*. You suggest that the Department of Industrial Intelligence should consist of the Directors of Industries in the different provinces and the object is to bring the manufacturers and investigators closer together, into closer co-operation. I would suggest that the greater the actual advance of the particular manufacture, the less will the Director of Industries have to do with it. They have concerned themselves hitherto with the smaller things?—*A*. What I had in view in drafting these lines was the case of the small manufacturer who perhaps did not know of the existence of any institutions which might be helpful to him.

Q. We had evidence from Sir Alfred Bourne that references are made by Provincial Directors to the Institute of Science. There are Provincial departments in Madras and in the United Provinces. Do you find many references coming from Madras or the United Provinces Industrial departments?—*A*. So far as my own department is concerned I have never had any. But my chemical colleagues would be able to speak with more authority on the point.

Q. Did you get any references from the military people?—*A*. No. Not so far as my department is concerned.

Q. About hydro-electric sites one reason why people are not taking to it readily is the extraordinary difficulty in getting sanction. There is considerable doubt as to the title to water. In some cases you have got Government jungles and sometimes it is a mixture of Government land and private land. And there is great doubt as to the use of the water. Has anything been done in other countries so far as you know to settle such questions?—*A*. The only sort of legislation that has been attempted on the point is, as far as I know, that dealing with the compulsory purchase of land which is required for the power transmission line; the object being to make it impossible for a private individual to thwart a power supply company by refusing to sell them the necessary land.

Q. Where is this?—*A*. Legislation on this point has been discussed in England and also in the United States.

Q. That of course is a public thing, more or less of a public nature. But a hydro-electrical scheme need not necessarily be a public concern at all. It might be a purely private concern?—*A*. The idea is that even a private concern should be able to effect compulsory purchase. It would not generally involve any great sacrifice on the part of the person who is compelled to sell the land, because in some cases the amount of land required is only a small strip. The object of having definite legislation on this point is to prevent the success of a power supply company from being jeopardised by unreasonable obstruction on the part of individuals.

Q. With reference to over-lapping you think that it is fully desirable that each worker should be fully informed of what is being done by his fellow-workers elsewhere. At what stage should they be informed of what is being done by other men working at the same subject?—*A.* I do not think that you could possibly make any hard and fast rule about the matter.

Q. In that case still less could you compel a man to make it known from the beginning?—*A.* Quite so.

Q. Would you suggest that what could be made known should be made known?—*A.* I think that this is one of the functions which the Science Congress could very profitably perform. It brings workers in different parts of India into contact with each other and enables them to ascertain what others are doing.

Sir F. H. Stewart.—*Q.* How often does the Science Congress meet?—*A.* Once a year.

Q. How long?—*A.* Three or four days.

Mr. C. E. Low.—*Q.* It only brings a few leading men. It does not bring everybody?—*A.* It does not. But it is likely to be more and more representative as time goes on.

Dr. E. Hopkinson.—*Q.* Is it not analogous to the British Association?—*A.* It is intended to take the place of the British Association in India.

Mr. C. E. Low.—*Q.* The distances being great in India, you have to spend a week in journeying and then it is difficult to secure regular attendance?—*A.* That is so, undoubtedly.

Sir F. H. Stewart.—*Q.* Would you develop your note a little further and say that you consider that hydro-electric schemes are an urgent need at the present time?—*A.* I do not consider it a question of immediate urgency but it undoubtedly will become one for future generations and it seems to me that anything that we can do to reduce the present rate of fuel consumption will be a benefit to future generations. Now take the question of the application of power. In many cases it does not matter very much whether we use hydro-electric power or thermal power. But so far as one can see at the present time, there are certain applications which absolutely require the use of thermal power. Take the problem of the propulsion of ships, for example. What should we do if we had no fuel supplies? We should have to revert to the old days of sailing ships, and my idea is that in view of the fact that our supplies of fuel are gradually running short, we should as far as possible attempt to limit them to those applications in connection with which they are absolutely essential. Now take a textile mill. There is no reason why this should use thermal power if it can get hydro-electric power. There is as it were no justification for it from a national point of view.

Q. Such a survey will be a protracted and very costly process?—*A.* It would have to be done gradually.

Q. And is it your idea that it should be undertaken by the various Provincial Governments?—*A.* I think that will be the best way of doing the thing.

Q. You mean through the Public Works Department?—*A.* Yes. Under some central control.

Q. For all India?—*A.* Yes.

Q. In the meanwhile if any responsible private person came along and wished to take up such a survey, you would encourage him?—*A.* I should by every means.

Sir D. J. Tata.—*Q.* Suppose a private firm conducted such a survey, should not the private firm be given priority over others?—*A.* I undoubtedly think so. You could hardly expect a private firm to incur expenditure on work of this kind without deriving some benefit from it.

Q. What would you say of a Government that refused such rights?—*A.* I do not think that would be fair on the part of the Government.

Sir F. H. Stewart.—*Q.* With reference to your suggestion for the creation of an Industrial Intelligence Department, do you contemplate that the Director of Industries should necessarily have any scientific knowledge?—*A.* Not necessarily. He should be a good organiser and the sort of man who can elicit information from other people and bring investigators and manufacturers into contact with each other.

Q. Your idea is that he should rather focus the needs and wishes of the manufacturers and present them in a suitable form to the investigator?—*A.* That is so.

Q. In regard to the co-ordination of research, would what you say bear on the desirability or necessity of a central research institute? Have you any views on the subject?—*A.* I have no definite views on this point. In certain cases the question very largely depends on the nature of the researches with which you are dealing. There are some types of research that require exceedingly expensive equipment and it would appear to be a waste of money to duplicate such equipment. In other cases, where the equipment is of a comparatively inexpensive kind, I see no objection to adopting the principle of a number of local centres rather than one central institute.

Q. In the work on which you are engaged particularly, what would you say with reference to that?—*A.* The equipment is of a very expensive type.

Q. And you think that the needs of India for a good many years to come would be met by having one central institute?—*A.* So far as my subject is concerned I think so. Yes.

Mr. A. Chatterton.—*Q.* In answer to Dr. Hopkinson you spoke about the researches that are being conducted in your laboratory. Would you mind supplementing that by stating whether these researches are used as a method of teaching or whether they are conducted for determining a definite solution of a particular problem?—*A.* Both objects are served simultaneously, I think. Students engaged in an original investigation are trained in methods of research and at the same time the main object of the research is the solution of a particular problem. Both objects are attained at the same time.

Q. Are these problems which are tackled in your laboratory here peculiar to electrical engineering in India or are they of a general character?—*A.* So far they have been of a perfectly general character and have had no special reference to Indian conditions.

Q. Are there any problems which you know at present which are peculiar and which it is desirable to take up and investigate?—*A.* Not that I am aware of. If you examine recent investigations in electrical engineering you will find that they are of a general nature and that they have no relation to local conditions. At the same time it is quite possible that questions may arise which have a bearing on local conditions. To take an instance—some manufacturers at home continue sending to India instruments with paper scales. Paper scales are satisfactory in Bangalore and other places in which the climate more or less approaches that of England. If you send instruments of this type to Bombay they are rendered useless in a short time. That is an instance where local conditions come in and it is conceivable that to a limited extent researches of this kind might be carried out. But the scope of such researches would be very limited.

Q. There is another point about the students who join the electro-technical department. Do you think that they have had a sufficiently good preliminary training in mechanical engineering?—*A.* They have had no training in mechanical engineering whatever and by suitably arranging the courses we have to give them the necessary mechanical training. An important part of the training consists of the vacation courses of practical work. During the three months vacation the student is sent into works either connected with some Government department or belonging to a private firm. He gets additional training in the use of tools and the handling of machines and gains a first-hand knowledge of workshop routine.

Q. How many years' course is that?—*A.* It is a three years' course.

Q. Do you think you have adequate facilities for training in mechanical engineering?—*A.* We do not possess sufficient facilities at the institute for specialising in mechanical engineering, and it has never been our aim to do so. The mechanical training which our men receive has been shown by practical experience to be sufficient for the special type of man whom it is our object to turn out.

Q. What is the special type of man?—*A.* A man who is capable of taking charg of electrical plant. There are some branches of electrical engineering with which w do not attempt to deal at all. Take electro-chemistry. That is an important branc and we do not attempt to deal with it at all. We cannot touch it now.

Q. Is it desirable that facilities for research in electro-chemistry and electro-metallurgy should be instituted in this country?—*A.* I think it is. I think that in all probability there is quite an important future for electro-chemistry in India.

Q. Could you indicate at all where a suitable place for taking up such work woul be? Are there any peculiar facilities required such as hydro-electric power and so forth? —*A.* That would be the prime consideration, namely the possibility of having at one' disposal large amount of cheap energy.

Q. Is the Indian Institute of Science at Bangalore a suitable place for electro-technical developments of that character?—*A.* To a limited extent it would be. I would not be suitable for large scale experiments. Power would be rather expensive It is fairly cheap compared with other places in India but it is doubtful whether at th rate the institute has to pay for power at the present time you could carry out experiments on a very large scale.

Q. That is merely a question of the cost of power?—*A.* Yes.

Q. Letting alone the question of cost is it a physical possibility to get the amoun of power that you want in Bangalore for large scale electro-metallurgical experiments —*A.* It would not be under present conditions, because the present capacity of th transmission line would be insufficient to deal with very large amounts of power.

Q. Are you speaking of the local transmission line or the longer transmission line?—*A.* The longer transmission line between Bangalore and Sivasamudram. What I mean by large scale experiments is, say, experiments with an electric furnace taking three thousand kilowatts or something of that kind. Anything not exceeding 500 kilowatts would be a small scale experiment.

Witness No. 268.

Dr. G. J. Fowler, D.Sc., F.I.C., *Professor of Applied Chemistry, Indian Institute of Science, Bangalore.*

Written Evidence.

My evidence is given with some reserve, as I have not spent a great deal of time in India and I have not had actual control of an Indian industry.

I have however considerable experience in connection with endeavours to improve the methods of manufacture of shellac both here and in England and while studying sanitary problems both in 1906 and 1909 I have of course had opportunities of becoming acquainted with the general conditions which prevail in India.

During the year which I have spent as Professor of Applied Chemistry in the Indian Institute of Science, numerous technical problems have been investigated under my direction. I may mention particularly the utilization of mahua flowers and various grains in fermentation industry and the preparation and use of indigenous dyes.

I propose to deal generally in the following paragraphs with the various subjects of inquiry suggested by the Commission.

Financial aid.

I am of opinion that no industry can flourish where the manufacturer declines to take responsibility and risk. Grants in aid by Government must be only for increasing facilities for obtaining working capital or plant, but the Government should not be asked to bear risk other than that common to any form of credit.

The forms of Government aid which seem to me least objectionable are—

(*a*) Loans with interest.

(*b*) Supply of machinery and plant on the hire purchase system.

(*c*) Exemption for a limited period of the profits of new undertakings from income-tax.

The best form of supervision would be the appointment of Government Directors with defined power for the period during which direct assistance lasts.

Technical aid.

There is no doubt that noticeable benefits to industry may be derived from researches made by Government Departments or Research Institutes. Sandalwood oil, indigo, dyeing and tanning are cases in point.

I am of opinion however that the cost of such investigations should be borne either by an Association of a number of firms interested or by individual firms. The fees should be paid in most cases to the Government Department or Research Institute engaged in the researches and equitably divided between the department and the individuals actually engaged upon the researches. In this way no personal difficulties need arise. Patent fees and shares of profits can be similarly dealt with. It would always be open to a manufacturer or group of manufacturers to ask for the services of a given individual, who might be liberated under specific conditions by the authority under which he normally worked. Fees might be lower in the case of firms who did not object to publication of results.

Besides such direct aid to industries, Government Departments or Research Institutes would be continuously investigating problems of general interest on their own initiative and publishing the results.

Scientific departments.

I am of opinion that an Imperial Department of Chemical Industry can be usefully created, having its headquarters at some suitable centre and with branches throughout India.

I am clearly of opinion, however, that the development of industry calls in a special degree for individual initiative. It would be essential therefore that promotion should be by merit only and not by seniority and that only a portion of the stipend should be fixed, large freedom being allowed for the earning of fees by individuals on the lines indicated under the preceding paragraph.

The Indian Institute of Science is well-suited to be the headquarters of such a department for the reason particularly that it is possible to work without strain at any season of the year. It is roughly equidistant from Calcutta and the large towns of Central India and the United Provinces and is well-situated in regard to Southern India and Hyderabad where raw materials of many kinds are abundant.

ORAL EVIDENCE, 13TH FEBRUARY 1917.

NOTE.—The revised list of past and present students of the Institute will be found in the written evidence of witness No. 266.

Dr. E. Hopkinson.—*Q.* For the benefit of some of us will you tell us what your professional career has been?—*A.* I was educated at Manchester. I am a Doctor of Science of the University of Manchester. I was lecturer in the Chemical department there for a number of years. I was lecturer in Metallurgy, and afterwards joined the service of the Manchester Corporation in connection with the sewage disposal scheme and became Superintendent of the Sewage works there and controlled an annual expenditure of £35,000 on revenue account, besides being responsible for the chemical side of the design of the works costing about £300,000, I suppose. In 1904 I was made Consultant to the Corporation with freedom for private practice, and at the same time I went back to the staff of the university as lecturer on Bacteriological Chemistry, and as a matter of fact I still hold that appointment in an honorary capacity. Recently I started the organisation of a laboratory there, known as the Frankland Laboratory, in connection with the question of nitrogen which includes the question of the disposal of sewage, and the action of manures in relation to agriculture.

Q. Does it include the extraction of nitrogen from the atmosphere?—*A.* We have not tackled that. It does to this extent, that it includes research on the fixation of nitrogen by bacteria, but not on the electrical side. I may say that in my consultant capacity I have been consulted by a large number of authorities, particularly the Government of Bengal. I was over here in India in 1906 dealing with the pollution of the Hughli. In 1909 I was here advising the United Provinces, and at that time I was particularly interested in the development of shellac manufacture. I have had since large experience in that at home in connection with firms in India. I have also had occasion to go to New York to advise about the disposal of the sewage of greater New York.

Q. Your experience has been extraordinarily varied, varied in particular directions in which you can be of particular assistance to us. During the time that you were engineer in the service of the Manchester Corporation, what was your title?—*A.* I was Superintendent of the Sewage works at one time and more recently I have been consulting chemist.

Q. But before 1904 you devoted your whole time to the work of the corporation, and were not permitted to take outside work?—*A.* No.

Q. Since 1904 you have been acting as consultant chemist with perfect freedom to take up work of any sort?—*A.* With certain limits. I could only be away from Manchester a fortnight at a time without leave. I was not allowed to leave the country without leave.

Q. Viceroys are subject to such restrictions, are they not? During that time you held a professorship or lectureship in connection with the Bacteriological laboratory at Manchester?—*A.* Yes. I was under Professor Delépine, but in more recent years I have been more independent.

Q. Is the Chemical department independent of the purely Bacteriological department?—*A.* Entirely, but I was for a number of years with Professor Delépine as a member of the Public Health Laboratory, and after that the connection was severed by the different arrangements made, and I had an entirely independent appointment in the Chemical department. My lectureship was transferred from the Public Health department to the Chemical department, where I was given a laboratory of my own under my immediate control.

Q. You were a member of Dr. Delépine's staff, and that particular department was doing a large amount of work for public bodies?—*A.* That is so.

Q. Were you then free, in any sense, to undertake private work of the same nature that the laboratory was doing?—*A.* Yes, I had a special personal arrangement with Professor Delépine which worked extremely well.

Q. We shall be glad to hear the outline of it?—*A.* I shall be glad to tell you the conditions. The arrangements were briefly these. That in anything where the laboratory was made use of 25 per cent of the fees went to the laboratory. If I did all the rest of the work, then I took 75 per cent. If I asked for the assistance of anyone in the laboratory, then I took half. If I merely brought the work to the laboratory and did not do any of it myself, I only took 25 per cent. That is in all cases where it involved experimental work in the laboratory; anything that was merely concerned with my own work outside, such as the giving of evidence, or making inspection, etc., that the laboratory did not claim. For example, I have been engaged with Professor Delépine on the question of the Bolton water-supply. We have gone out together making examinations: for the time spent outside, or going up to London, no claim was made by the laboratory but of anything for the analyses of the samples, they took their proper share. On the other hand sometimes Professor Delépine would have a large research entrusted to him, part of which he wished me to help him with, and then we would adjust matters equitably.

Q. He himself is personally free, I presume, to take private work?—*A.* I believe so, though I speak with some reserve. He was at one time, I know, but I am not sure whether his salary has not been made so large that all the fees go to the laboratory. I really don't know.

Sir F. H. Stewart.—*Q.* Had you a free hand as to the work which you brought to the laboratory, or took outside?—*A.* Absolutely.

Dr. E. Hopkinson.—*Q.* Supposing there had been an outbreak of enteric at some public institute supposed to be due to contamination of water, and an investigation had to be made; that might either be brought to you privately or be brought to the laboratory in the ordinary course?—*A.* I have had to do it.

Q. Would there not be a conflict of interest between you and the laboratory?—*A.* There never was.

Q. You must not judge things entirely from your own experience. I want you to look at it from an impersonal point of view?—*A.* I quite agree, but perhaps I am interrupting.

Q. Not at all?—*A.* In that case, for example, there was the case of the David Lewis Colony where they had an outbreak. We investigated the question of water-supply, Professor Delépine and I together. It came to me first. The rule that I always made was that anything of a medical nature, on which I would not give an opinion, such as the question of enteric, I took as a matter of course to Professor Delépine, and we arranged how the work was to be done, and we worked it together, and in that case the work came very largely under his responsibility, although in actual fact I believe this particular portion of it was first of all brought to me. I, as a matter of fact, was personally responsible for the sewage disposal at the Colony, and for certain work there I had fees, quite independent of the laboratory, and that of course came directly under my cognisance; but the point I wish to make is that in a case like that there would be certain things such as investigation to see whether the enteric organism was there, which I should not undertake, and I would not wish to take that responsibility. I would only take responsibility for things I was qualified to do.

Q. You think it quite possible to frame regulations in such cases which will safeguard the interests of the institution?—*A.* I am certain of it.

Q. And avoid anything in the nature of disputes or insinuation that either one interest or the other was favoured?—*A.* I am sure of it. In regard to our relations in a business capacity, these were the happiest; we never had the smallest difficulty.

Q. Would you not regard it as an essential feature of such regulations that the Director or the Principal, or whoever is the head of the institution, should be fully acquainted with every case of the nature of which you are speaking?—*A.* I think that is desirable.

Q. In detail as well as the nature of the work?—*A.* I think upon the whole that is desirable.

Q. You would not put it more strongly than being desirable; you would not say it was essential to really smooth working?—*A.* I don't know that it is altogether essential in all these cases. There are matters of small detail which if you worry too much about would create the friction you wish to avoid. Taking the liberal view I think the Director should know all that is going on, in order that there should be co-ordination of the work.

Q. I don't want to ask you questions of a more personal nature than necessary, and if you feel it to be so, decline to answer, but taking your arrangements here in the Institute of Science, they are not quite, I understand, of the nature that you have been describing. You are under agreement as a professor?—*A.* That is so.

Q. For a term?—*A.* Yes.

Q. And there is no obligation, at the expiration of the term, for the continuance of the agreement on either side?—*A.* No.

Q. To what extent are you unfettered as regards taking private work?—*A.* So far I have no restrictions put upon me at all, except the somewhat vague phrase that the opinion of the Council shall be necessary to the working of the department. I think that comes in the general by-laws of the institution.

Q. Does that constitute an obligation, in your opinion, to bring anything before the Council that you may be engaged upon?—*A.* I don't think so, except in a large case I should certainly do so. In small matters I should not think it necessary. It rather follows from what I have been just saying that very small things are apt to create possible misapprehension, and to waste people's time in discussion, but in large matters, for instance, the question of my position as Consulting Adviser to the Government of India on the question of acetone; that was brought before the Council and passed. But in matters for instance like this, if somebody asked me to analyse samples of material and there was a fee of a few guineas, I think it would be trifling to occupy the time of the Council.

Q. It might be desirable that some sort of apportion should be made as to the work?—*A*. Certainly, as I have said, I would be perfectly willing that the whole thing should be regulated and organised on some such simple basis as I have just sketched out. I think that would be perfectly equitable, but at present there is no definite system in the matter.

Q. I take it from what you say that you think that the regulations ought to be further defined and strengthened in that respect, in the sense that the professor, whoever he may be, ought to be under obligation to inform the Council more fully than is provided for at the present moment?—*A*. I think that if matters developed things should be put on a better footing. That is quite reasonable from every point of view.

Q. As part of that business footing you suggest in your evidence that there should be some arrangement for the division of fees?—*A*. I think that in the end it would conduce to smooth working throughout.

Q. Take the case which you have just mentioned, your work done in acetone for the Government of India, set aside for the moment the question of that being war work, supposing it was ordinary peace work, I understand that it is occupying your whole time?—*A*. Hardly so, not my whole time. It was the main thing, but there were a number of other things that I had to look after at the same time.

Q. Supposing at that time there were other matters which were not directly connected with the institution and which were occupying the whole of your time, and for which you received a remuneration, and at the same time that you were receiving a stipend as professor, how can you justify such an arrangement in the interests of the institution?—*A*. I should justify it in this way, that when—I may put it without being egoistic—the incumbent of a post has a large amount of work to do in the ordinary way in peace time, there would be more and more possibility of assistance, and he becomes more and more in the position of a director of a large office. It is not a question altogether of the actual personal time of the head of the department; it is the thought that he puts into it. For instance, the head of a large business is not concerned to spend the whole of his time in one part of his works, but he co-ordinates the whole thing. He may sit in his room the whole day and never move out of it, yet the whole place is moving round. It pre-supposes ample assistance. At present the condition of things is not altogether satisfactory because one has not the adequate number of responsible assistants, but if you are to do the kind of work that this place could do, you must have an ample staff, and you must get the best value out of the head of a department. You must give him ample assistance and then the amount of work turned out under his supervision is practically unlimited.

Q. Would you say that such an extreme case as I put is justified by the business it brings to the institute and also by the opportunity it gives for the professor to give instruction in research work to the students; are those two factors sufficient to justify the stipend of the professor who was engaged all his time in other remunerative work?—*A*. You are assuming a case that should not really arise, because you assume that the professor is engaged all his time in other remunerative work. I don't think if the department was really run as it should be that that case should arise, because his time should not be occupied in that way; But even as it is, I can say this, I have felt justified in the time I have put into acetone, for just those reasons you have mentioned. I know that the students who have been working under me there have gained technical experience of a sort which otherwise they would not have got, and I think they appreciate that fact.

Q. Do requests for work of any sort come direct to you or to the Director of the Institute?—*A*. If I may judge from my correspondence, they are coming more and more directly to me.

Q. I presume in the ordinary course you would at once consult with the director?—*A*. I do in many cases. There are some things of a minor nature which I don't think I specifically mention to him.

Q. Are the requests which come to you generally from manufacturing businesses or from public bodies; or what is their nature?—*A*. I have had a number from manufacturing businesses, and I might take an instance which will indicate the way I deal with matters. I had a firm in Bombay who wrote to ask me for certain information. They gave me certain figures and enquired whether I thought it was a good proposition for making ammonium chloride from Bombay gas liquor. I said they might send me first of all an analysis of the liquor. They could not get it, I said, "Send me a sample, we will analyse it for you for a certain fee, and send me the fee along." They sent it, and I made enquiries at home about the plant, and got the figures. The other day when I happened to be in Bombay I saw the representative of the firm in question. He was very grateful for all that I had done. I really forget whether I submitted the matter to the director. At any rate the only question of fees so far has been the matter of Rs. 60 for the analysis. Whether anything developed out of it afterwards has not yet transpired. If it became something more than a matter of interchange of letters and correspondence, and really became a business proposition which was going to occupy some serious part of my attention, I should naturally bring it to the director's notice. I am not sure whether I have not done so.

Q. What are the arrangements made for publication of any research work in the Institute?—*A.* I have not had occasion to publish anything myself, but there is the Institute Journal in which researches are published.

Q. You might undertake a piece of research work for a private firm, of which the results were of public advantage, would not a difficult situation arise there, probably obligation to the private firm from whom you receive remuneration would preclude publication to a great extent; at the same time it would be very much in the public interests and also in the interests of the institute that they should be published. Can you suggest any means by which such a difficult situation can be met, with due regard to all interests?—*A.* That involves a very difficult question indeed, because it is a question of the value of the information. No doubt there is information in the hands of private firms which the public would like to have in order to use it for their own advantage, although the firm may have spent a very large sum in obtaining it, therefore it becomes a question of equity. In cases of that sort it would be necessary to define your position at the outset and define the position of the firm. If the firm desired the secrecy then it would be paying heavily for it, and the institute would reap the benefit of it. This is the opinion at home to a very large extent. I sometimes think, if I may say so, using the term in its strict significance, that the academic authorities do not sufficiently realise what the value of technical information is. A number of my friends say, "I cannot understand these manufacturers, they are so secretive." We know that there are some manufacturers whose secrets do not amount to much, but on the other hand there are firms such as a firm I know of in Manchester who spend many thousands pounds and patent devices as a result of that large expenditure, which, if they were to be given freely to the public, would mean great injury to the firm. Therefore it is a very large question which must be dealt with as far as possible on principles of equity.

Q. But you think that regulations can be framed and agreements made with the staff of an institution which would provide for such cases fairly, both from the point of view of public interest and that of the institution?—*A.* I think that is so. The situation must be faced here more than at home. Of course it has been considered very carefully in the United States, as you probably know, and there are various schemes there for carrying out the exploitation of patents.

Q. Will you tell us what is the arrangement in the United States?—*A.* There is a scheme which has been worked with considerable success which was described before the Eighth International Congress of Applied Chemistry. Professor Kennedy Duncan has written on the subject, and it owes its genesis to Mr. Cottrell. Principally the method is by what is known as the Research Corporation, i.e., a number of responsible and well-known individuals who are willing to put down certain sums of money to exploit processes or inventions or patents which seem to be likely to be of benefit to the public in general. At first that money is only spent on experiments and in modest salaries. As the experiments develop, and a manufacturer, for instance, desires to make use of the invention, it is still under the control of the Research Corporation, the fees are paid to it, and by and by the thing begins to finance itself as it goes on, but all the time the money is held in trust for the public. The salaries paid to the workers in this corporation increase as the receipts increase, and so the thing finances itself as it goes along. I am speaking from recollection. It occurred to me that this might be interesting to the Commission, but I have not got the actual reference before me. It is in the Institute library. It has occurred to me as possible that the Government possibly in combination with private individuals, might form such a corporation.

Mr. C. E. Low.—*Q.* Is this a sketch of things that actually happened?—*A.* Yes. One thing that developed very successfully on those lines is the electrical condensation of fumes from metal work.

Mr. A. Chatterton.—*Q.* What is the name of this university?—*A.* It is not an university. The University of Pittsburg has worked on those lines, I believe in conjunction with the Research Corporation.*

Sir F. H. Stewart.—*Q.* Supposing A was a member of this corporation and obtained its help in a certain direction, and B, who was a competitor of A went to this institution for help in the same direction as A. Could B get such help?—*A.* Certainly.

Dr. E. Hopkinson.—*Q.* You answered Sir Francis Stuart that B would get the full benefit of the work done by A, will you explain how that is?—*A.* That is to say, if I may take this case for example, the case I had in mind about the condensation of fumes. Supposing A was a zinc works and spent a great deal of money in finding a method of condensing fumes, and B was an antimony works, or any other works wanting information to condense its fumes. He would have the advantage of all the experience at had been gained by A, but he would have to pay for the specific application of the me to his own particular problem. If he came second he would have to pay a higher e than A who came first.

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* See supplementary note printed after oral evidence.

Q. I had a different case in mind. Supposing you worked up a method of distilling ndalwood oil for a certain individual and it was a success, and another asked for at information, what then?—*A.* Then as I say it would be a question of how much e was wanting to pay for it. If it was not protected, then anybody can take it up, ut if the firm A had spent a large amount of money in acquiring this information—ne is assuming that it is a thing that could be protected—then nobody can take it up.

Mr. C. E. Low.—*Q.* What do you mean by "protected"?—*A.* Protected by patent.

Mr. A. Chatterton.—*Q.* Supposing you had worked out a process for a firm A as long as you were retained by them you would consider that the whole of the information you got in connection with that particular industry was a matter between you and the firm and if the firm wished to retain that information as a private matter, you would expect them to give you a definite retainer so long as they wanted it?—*A.* Yes.

Dr. E. Hopkinson.—*Q.* It seems to me that there is some difficulty in regard to the funds of a public institution, or rather the resources of a public institution being applied for private benefit?—*A.* Well I suppose everyone of us who has been educated at an university has been educated at the expense of the public; it is a question of more or less.

Sir D. J. Tata.—*Q.* But that education is open to everybody?—*A.* Yes, and in this case the public also benefit, because the firm pays and pays heavily for special privileges and that money goes back to the public to be used for other things, so the public gets it all right. It is all a question of equity generally, and equitable arrangement throughout.

Dr. E. Hopkinson.—*Q.* Supposing that the Government of India set up an organization which would include all chemists, including therein all those engaged in teaching or in research institutions. Supposing such an organisation were graded into senior chemists and junior chemists, with a Director-General at its head. Would it be possible to work somewhat on these lines? If a particular Province wanted an Agricultural chemist he would go to the central organization. He would have various names submitted to him by the Director-General, and from them would elect a man suitable for that purpose. The man might be chosen by merit only from any rank of the organization, and he might go to take up work as a chemist in the Province for a specific period of five or seven years. The remuneration which he receives under that arrangement would be the remuneration which the particular Province would give for the appointment. It might be largely in excess of the average remuneration, or it might be less. At the end of that period of service he would return, so to speak, into the reservoir of the Government organization, return to his particular grade, awaiting another appointment. During that time he might go back to the headquarters or the central laboratory and be engaged in research work, as arranged by the Director-General. Such a scheme might be applicable not only to the particular instance of Agricultural chemists, but also to teaching posts in universities. You have a professor appointed, and after he has been professor he might be Agricultural chemist. That I think might be not an inconsiderable advantage in the development of such a scheme. In regard to recruiting, do you think it feasible that recruiting should go on in the organization suggested for all ranks? I mean obtain new material, new members of the organization. For instance, a man who attains to considerable reputation at home might come out and become a member of the Imperial organization at once in the higher grade. He might be senior chemist or Deputy Director, or you might get men who had only just taken their degree at home come out as probationers and get two or three years' experience in India in some particular firm. Do you think that such a scheme is feasible, and would it induce the best men to come in?—*A.* It appears to me so. The essential thing in my mind is that a man should have full freedom to develop his individuality, and that his success should depend upon that and not on regulation. I take it that question of recruitment rather implied what I was saying, that a man if he came out in that way would know that he had opportunity of developing his abilities, that he would not be simply on a grade where he would stay till he was moved up in the ordinary course of things.

Q. You suggest in your note that it is essential that promotion should be by merit only and not by seniority?—*A.* I feel sure of that.

Q. And promotion by merit exists in Imperial organization?—*A.* Of course all human things have their difficulties, but what I feel so strongly about, as I have said here, is that the development of industries calls in a special degree for individual initiative and a constructive rather than a critical type of mind. Criticism is of course necessary and highly desirable, for many purposes it is perhaps the type of mind that is required; but for the development of industries you do require boldness and initiative and freedom, and the problem is to get that in a service and at the same time enable a man to feel that he has not all the time to be anxious about his mere bread and butter. I must say that my own experience has been that while, for example, I would not like to accept a full time appointment, on the other hand to have some fixed appointment and a minimum of fixed salary enables a man not to worry about his bread and butter, and at the same time leaves him free to develop in all other directions; whereas if he is simply dependent on his appointment for the whole of his income, and he knows that if he does his duty in an ordinary prosaic way he will be promoted in due course, there is great temptation even under the best conditions for him to become critical rather than constructive.

Q. I think what you say is rather a strong argument in favour of such a scheme that I have suggested in this way, supposing that a chemist who was a member of the Imperial organization as such got a stipend, but probably a small one, according to his rank in the organization. If he is appointed to any work outside he would probably be receiving very much higher remuneration, but he would know it would come back to him and it would give him what is a great desideratum, viz., scientific independence, so that he would go his own way and he would know that he would come back home on the expiration of the tenure of the post and that he would come back to an organization which was capable of recognizing the value or otherwise of the work?—*A.* I feel very considerable agreement with what you say.

Mr. C. E. Low.—*Q.* Supposing a chemist was a member of a general Chemical Service and was not attached to any particular job, supposing he has in fact come home to his chemical service, what work would he be employed on?—*A.* He would be doing general research, building up his reputation.

Dr. E. Hopkinson.—And it would be necessary to have an institution whose business it would be to make for stock.

Mr. C. E. Low.—*Q.* I understand that these men are cut off from the analysts; you are not referring to the analysts?

Dr. E. Hopkinson.—*Q.* Suppose a parallel organization of chemists. There are organizations of botanists and possibly of mycologists, and that they all lead up to a department of Government. Do you think it would be possible to choose as head of the Imperial Scientific Service of the Government of India a man who was proper head of all the different branches. Would an organization of botanists be ready to accept the leadership of the chemists who had risen through the chemical ranks?—*A.* I would not like to say chemists who have risen through the chemical ranks. I would like to say that all ranks, whether mycologists or botanists or chemists would be willing to accept the headship of a man of certain standing and calibre, whether chemist, botanist or mycologist, or neither of them, so long as he had a wide habit of mind and especially the scientific habit of mind and a wide grasp of business. I think it would not matter what his particular line of approach was, what his speciality was. What seems to me so essential in the guidance of all this is the scientific point of view which a man should have. You might have, for instance, a great manufacturer who might not be a specialist in any particular line, but who would be a man of large experience. You have the case of one of the Directors of Crosfield's. A Director of Crosfield's has had under his consideration large problems of engineering, large problems of raw materials from tropical countries. He has had to consider botanical problems in connection with the sources of his oils; bacteriological problems in connection with the fermentation of oils, all these things in a big way. A man of that description who has had large experience and large responsibilities and has the scientific and broad outlook, it would not matter whether he began as a chemist, what he does is the important point.

Sir D. J. Tata.—*Q.* Towards the end of your written evidence you say, with reference to the location of Indian Institute of Science, that "it is possible to work without strain at any season of the year." Is a favourable climatic condition of great importance in chemical research?—*A.* Unquestionably.

Q. Do you think an institute of this kind could not be placed with advantage in a warmer place like Bombay or Calcutta?—*A.* No, because during certain months of the year it is almost impossible to work with real freedom.

Q. Would that be a serious handicap?—*A.* Undoubtedly.

Q. You are about to do some work on fertilisers for the Tata Iron and Steel Company. Is that through the Director or through direct communication?—*A.* Direct communication. The Director knows all about it.

Q. You have not placed it before the Council?—*A.* I don't know the details of it myself. I have brought the question as to whether I was at liberty to go to Sakchi before the Director.

Sir F. H. Stewart.—*Q.* In a general way, I suppose, the Director would represent the Council in a matter of that sort?—*A.* Yes.

Sir D. J. Tata.—*Q.* In this case there is a possibility of the Board of the company giving a substantial annual grant to the institute to carry out these investigation?—*A.* That was the argument that I brought before the Director that it was not entirely a personal matter.

Q. Is that work to be taken up by you entirely and as an individual, or by the institute as such?—*A.* I have not discussed this with either the Director or the Company in detail; but I take it that the institute on the whole will benefit most.

Hon'ble Sir R. N. Mookerjee.—With reference to your answer to Dr. Hopkinson that certain laboratories receive 25 per cent, and some receive 75 per cent of certain research work, is that the usual practice in Europe in other laboratories?—*A.* There are other institutions I believe, but I don't know the details of their arrangements.

Q. I mean arrangements like that?—*A.* That is so. There are numerous laboratories of that sort spreading in the country. Arising out of that question there is one point I would like to make. The principle that was always maintained in the Public Health Department was that the fee should be in excess—if only slightly—of that which would be charged by private practitioners, so that there would be no competition with private practitioners.

Q. Supposing that the system is introduced in this institute here, and any correspondence came direct to you, in that case you would have to keep some sort of record and that would be a sufficient guide to the Director of the Institute as to what you were doing, so that it does not matter whether you or he received direct communication from the parties; the fact is that the Director would know from your record what you were doing?—*A.* Yes. The thing could be a matter of purely office work.

Q. But that is not the present custom in your institute?—*A.* No.

Q. Are you agreeable to alter your custom to that extent?—*A.* Perfectly. I suggested it myself originally.

Q. Supposing the institute authorities or the Government refused to do that, what would you think reasonable pay for a scientific man like a chemist or botanist who would not be allowed to do private work and which would tempt him to come out?—*A.* I do not know. I do not think I would come out on pay. It is not altogether a question of pay. It is a question of freedom. I have practically had an opportunity of entering a very large firm at home and I dare say I should be making a great deal more money than I am now had I taken it, but I refused it because I think the enthusiastic scientific worker values his freedom almost more than money considerations.

Q. How would you draw your line whether you are exceeding your limit when taking outside work to the detriment of your own institute?—*A.* It is very difficult to answer a question like that exactly, because it is rather more a question of one's personal feeling and judgment. You cannot say, here you are transgressing and here you are not. Briefly, I may say that as a rough guide to myself I would charge fees where I had personally to go away and inspect something and personally give an opinion. But I would not charge any fees where it was a matter of development and where the industrialist in question or the firm in question was not gaining immediate benefit. But even so, one takes each case on its merits and judges more or less what is a fair thing to do. It is impossible to draw a definite line.

Q. You have said here, "I am of opinion that no industry can flourish where the manufacturer declines to take responsibility and risk." That is the question in Europe but in India the facts are not what you state here. There is hardly an industry that has developed until the Government comes forward. That is the whole question now before us. I am not talking of very big industries, but small industries too. Are you of opinion that Government should not give help to any industries?—*A.* I do not think I have said that.

Q. Now, there is this sandalwood oil. It has been proved to the country by Mr. Chatterton's work that it is a paying industry in India. But until the Mysore Government had the funds, or rather Mr. Chatterton had the Mysore Government at his back, you would not be able to do anything?—*A.* Does that not happen to be a Government monopoly more or less? I have said in my evidence, "There is no doubt that noticeable benefits to industry may be derived from researches made by Government departments or Research Institutes. Sandalwood oil, indigo, dyeing and tanning are cases in point."

Q. I do not think it can be a monopoly because there is sandalwood everywhere?—*A.* But supposing a capitalist as in the case of indigo, supposing indigo planters were wanting to spend money, not just a few hundreds, but thousands to put indigo on a satisfactory basis, there is no necessity that I see for Government *qua* Government to intervene.

Q. But perhaps you are not aware that Government give annually large sums of money for the indigo industry?—*A.* I know it does.

Q. That is a very direct help to an industry that has made its fortunes?—*A.* Government is doing it by grace, so to speak. But the real decline is not altogether due to

German competition. It is the question of a very serious defect in manufacture. It is not an argument in my mind for the intervention of Government. The real trouble lay with the planter.

Mr. A. Chatterton.—*Q.* Do you think that Government should not have established the Department of Agriculture?—*A.* By all means.

Q. Then what is the difference?—*A.* It is the question of financing.

Q. Financing research?—*A.* Financing research *ad hoc.* There are large industries where you would amass information which is not available to everybody.

Q. Take the case of indigo research?—*A.* Supposing you wanted to help a particular manufacturer to put down plant and to take advantage of the researches and the manufacturer wishes to apply them to his own work. In that case I think he should do it himself. Government may quite rightly and I have said here by all means, let the Government develop research on general lines, but when it comes to detailed application of those researches and making money out of it, then I think the manufacturer should be willing to pay. I make a distinction in the question of charging fees for the work I am doing. When it is for the general benefit I do not feel called upon to charge a fee, but when it gets beyond that and the manufacturer wishes to do something in his own factory in order to make money out of that research then he ought to pay.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Do you think one institute like this is quite enough for the whole of India, or in other Presidencies if the climate is nearly as good as this, there should be institutions where they can attract people and being near manufacturing centres they would be more useful if the money could be had?—*A.* That is a question of finance. Here we have a very fine laboratory and we are gradually expanding the plant and it is largely a question of money. One would think it would be better to develop this place to the utmost than to open up other institutions.

Q. Don't you think that it is far off from a centre like Bombay or Calcutta, and that it attracts fewer people from districts like Southern India where raw materials are available?—*A.* On the contrary, we have as much work to do as we can possibly handle. If we had more assistance we could do much more.

Q. For this part of India?—*A.* For all India.

Q. But at present your energies are directed towards this part of India?—*A.* My work is at present largely concerned with Hyderabad. It is only that we have not got enough assistance or we might do a larger quantity of work for the United Provinces. I have had enquiries from all over India.

Mr. C. E. Low.—*Q.* Have you had enquiries from the Directors of Industries in the United Provinces and Madras?—*A.* Yes. There are other officials also like the Forest officials, who have written to me.

Q. Have you had any direct enquiries from the proprietors of small industries of the swadeshi type?—*A.* Yes.

Q. How are these dealt with? Are fees charged in respect of these enquiries?—*A.* As a rule one has suggested a modest fee, and that has sometimes stopped enquiry.

Q. But with reference to enquiries from such men, supposing he made a sensible enquiry and the thing is fairly large and promises useful results, what would be done about a thing like that in the matter of fees?—*A.* If there was any difficulty I would discuss it with the Director and we would see what was best in the interests of all concerned. But as a matter of fact, we have not had enquiries which have evolved anything very large that way.

Q. You are aware that there has been a constant cry on these people's part for Government expert help being made readily available to proprietors of small struggling industries, who had not the knowledge or the means to get researches made in the ordinary way like the bigger industries can do, and it is certainly up to us to provide some means for these people to obtain information. Whether an institute like this is the best place for them to apply to is, of course, another matter. In a general case, such an enquiry would, I take it, be recognized as a public one?—*A.* I am not sure. Don't you think that which you get for nothing you value very little?

Q. Very often these people cannot afford to pay?—*A.* Then ought they to be engaged in industries?

Q. They can apply to the Director of Industries on merely technical matters. The matters you have been dealing with here would be technological, and any technical matter which occurs to such men they bring it to the Director of Industries and get a good deal of trouble taken by the Director of Industries and his experts in having the problem threshed out for them?—*A.* What one wants to try and get at—I have thought over this a great deal—is to get the maximum of help with the minimum of "spoon meat." A time will come when the Government support must of necessity be withdrawn. If you have not in that time produced a man who is capable of [illegible] it is bound to fail. Is it not possible to give your struggling industrial [illegible] every possible help in the way of showing him where he can get [illegible] he can get his raw materials, where he can sell his products and all [illegible] which should be more or less the business of the Department of Industries to work out. He should have all those things at his command showing him where he can get his information, giving him every possible facility and allowing him to hire machinery at a reasonable charge, allowing him to borrow a certain amount of money at a reasonable rate of interest and helping him in all those ways. But don't do it for him, otherwise you will never get a man who can get the thing to go on.

Q. Do you consider that members of the Indian Research Institute are at present sufficiently in touch with Indian manufacturers—I mean manufacturers of organized industries on a large scale?—*A.* I do not know that they are, but I am quite clear from my own experience that the thing is very largely becoming known and of course it all depends on what is turned out. The success of the institute would be the very best advertisement.

Q. You think it is becoming known? There are no specific steps you would suggest for making it known more widely?—*A.* What I am really frightened of is that we might get it known before we had machinery to do the work. At present we can hardly do the work that comes to our hands.

Q. Supposing you got more enquiries from manufacturers than you could deal with, would you suggest starting other institutions in other parts of India, or increasing this?—*A.* Increasing this.

Q. How far do you consider that the amount of private practice a man does should be considered a criterion of his usefulness from the point of view of the institution?—*A.* That is rather a difficult question to answer. I should think it is a question of a tree being known by its fruit. If the department flourishes that should be a sufficient answer.

Q. With reference to this service of Chemists that Dr. Hopkinson was mentioning, what would be the duties of the head of the department if there were a chief chemist?—*A.* As I have already explained, he would not necessarily be chief chemist but head of the department. His function would be to keep all the threads in his hands and generally inspire the whole thing and keep fully alive to all the requirements of the country.

Q. He might, of course, define which man should be deputed to which department?—*A.* Quite so.

Q. In all questions of promotion or discipline, his word would be of very considerable if not of final importance?—*A.* Yes.

Q. As regards actual research work do you consider that he should control the Directors or co-ordinate in such work?—*A.* I think he should co-ordinate. I think it is impossible to get the best value out of research work unless it is co-ordinated.

Q. Do you mean that he should prevent overlapping?—*A.* Yes.

Q. Entirely, or minimise overlapping?—*A.* Minimise overlapping.

Sir F. H. Stewart.—*Q.* How would that come in when you consider that the scientist in research requires freedom of action?—*A.* He would in his own line. If you had a man working on the fixation of nitrogen you would keep him on that line. He might have been working on the fixation of nitrogen in relation to wheat. Then he may be called upon to work, say, a problem in connection with indigo, but there would be two different applications of the same line of thought. But you would not turn the man who was doing fixation of nitrogen to the growth of shellac.

Q. Supposing the individual chemist wanted to work on the fixation of nitrogen, would you give the head of the department power to say, "No. You are not to do that. You are to work on something else"?—*A.* In the very early stages, yes, because the junior chemist is not always the best judge of what he should work at. I think some amount of control is necessary.

SUPPLEMENTARY NOTE.

The Research Corporation, an experiment in Public Administration of Patent Rights by F. G. Cottrell, San Francisco, California.

Some seven years ago the author while working in the University of California on a set of problems in sulphuric acid manufacture came upon certain phenomena which promised to lead to important improvements in the electrostatic collection of smoke and fumes from chemical and metallurgical plants. He was at once confronted by the old dilemma of adjustment between academic and commercial activities, as only through direct construction and study of installations on a commercial scale did it seem possible to develop into full usefulness the inventions involved.

Finally with the help both personal and financial of Professor Edmond O'Neill of the Chemistry Department and Dr. Harry East Miller and Mr. E. S. Heller, both alumni of this department of the university the commercial development of the project was undertaken and patent secured, the understanding among those thus actively concerned being that when the receipts from the business should have repaid the initial investment with reasonable interest at least a considerable portion of the patent rights should be turned over to the University of California or some other public institution to be administered as the nucleus of a fund for the promotion of research, it being also hoped that this might set a precedent and stimulate similar contributions from others.

The business and technical development of the project struggled through and over many difficulties and disappointments for the first few years but with a constantly growing scale of operation and it was not until the fifth year of the work that the latter repaid what the organisers had spent upon it.

It is not the purpose here to enter upon the technical details of the inventions involved as the early history of these was published a year ago and has since been extensively abstracted in other journals. A further supplementary account and discussion was also given at the annual meeting of the American Institute of Mining Engineers last February and two papers on the latest development of the subject are being presented before other sections of this Congress.

Merely as an index to the practical significance which the work has already attained, suffice it to say that installations made under these patents have now been in commercial operation for over five years and the largest of these have been on a scale representing a construction cost of over $100,000 each. The first were in the far west but several are now in operation or under construction in and about New York city.

By the time the work had thus reached a self-supporting basis, its significance was felt to have broadened to a degree which made its control by a local institution such as a single university inexpedient as the fullest success of such a movement is inevitably conditioned upon its being most broadly representative of the common interests of those whose co-operation and support it aspires to secure. Through Director J. A. Holmes of the U.S. Bureau of Mines, who had taken a very helpful interest in the work, it was brought to the attention of the Smithsonian Institution nearly two years ago, the informal discussion which followed resulting last October in a formal offer of the patent rights to the institution. The only condition qualifying this offer was that these patent rights should be given an adequate business administration and the proceeds be devoted to furthering scientific research.

In December last, after careful consideration and discussion which the prospective donors and under their hearty indorsement, the Board of Regents of the Smithsonian Institution adopted the following resolutions:—

> *Resolved* : That the Board of Regents of the Smithsonian Institution do not deem it expedient for the Institution to become the direct owner of the proposed gift of royalty-bearing patents.
>
> *Resolved further* : That the Board of Regents of the Smithsonian Institution decide that the Institution may properly accept a declaration of trust from the owners of the patents to hold and operate the same in the interests of the Institution, and to pay over to the said Institution the net profits therefrom.

and further authorized its Executive Committee and its Secretary Dr. Charles D. Walcott to co-operate with those from whom the offer had come in the organization of either a subsidiary or an independent board of trustees or directors to conduct the business side of the project.

In elaborating this plan, the organisers have tried to study carefully both the economic and academic needs which it was intended to subserve. The following are among the considerations which have perhaps had most to do in determining the form and policy of the new organization as finally constituted.

During the last few years the rapid growth of engineering and technical education, coupled with a general awakening to the commercial importance of research in the industries, has brought about a persistent demand the world over for closer and more effective co-operation between the universities and technical schools on the one hand and the actual industrial plants on the other.

The value to both sides from such co-operation is today generally conceded, but as to the most expedient methods of its accomplishment opinions differ, and we are still in the experimental stage of working out the problem.

One solution which has been extensively applied consists in the universities and schools permitting and even encouraging the members of their teaching staffs to go into private consulting practice. Another form of co-operation is seen in the industrial fellowships recently established at several universities, through which their laboratories undertake the investigation of certain problems for individual commercial firms or organizations, the latter bearing the expenses and receiving the first fruits of the investigations, but under restrictions as regards final publication and use, intended to justify the universities or technical schools in taking their part in the work.

While these and similar methods now in use bring about the desired co-operation it has been felt by some that they are open to the objection of introducing too direct business relations between the academic institutions or the members of their faculties and individual financial interests. As still another alternative intended particularly to meet to some degree at least this lost objection, the Research Corporation has been organized.

Briefly stated, this latter is a board of administration, whose work is to guide the development of such patents as may be turned over to it, and finally market them, the net profits from all such business being devoted to scientific research "by contributing the net earnings to the corporation—to the Smithsonian Institution and such other scientific and educational institutions and societies as the board of directors may from time to time select, in order to enable such institutions and societies to conduct such investigations, research and experimentation." Under this system, it will be noticed, a part at least of the financial returns of the scientific investigations of our academic laboratories automatically goes back to them for aiding further investigations.

But this represents only one side of the good which the plan aims to accomplish. Conservation has of late become a word of conjure with, and all manner of economic wastes are very properly receiving a too-long delayed attention. The men in our universities and colleges have been among the first and most effective in promoting the general conservation movement, yet there is what we may term an intellectual by-product of immense importance, a product of their own activities still largely going to waste. This is the mass of scientific facts and principles developed in the course of investigation and instruction which through lack of the necessary commercial guidance and supervision, never, or only after unnecessary delay, reaches the public at large in the form of useful inventions, and then often through such channels that the original discoverers are quite forgotten.

The Research Corporation was primarily intended to serve the evergrowing number of men in academic positions who from time to time in connection with their regular work evolve useful work and patentable inventions, and without looking personally for any financial reward would gladly see these further developed for the public good, but are disinclined either to undertake such development themselves or to place the control in the hands of any private interest.

During the process of organization, however, it became evident that the class of donors of patents to the cause would by no means be limited to men in academic positions, but rapidly extended not only to private individuals outside the colleges, but even to large business corporations who often find themselves incidentally developing patents which overrun their own field of activities. Such patents are very apt to get pigeon-holed and come to actually stand in the way of true industrial progress, even though their owners may realise that development and use by others would indirectly benefit themselves. As an official of one of the large electrical companies put it—"any extension of the use of electricity, or even power in general, is pretty sure eventually to mean more business for us through one department or another."

A procedure adopted in academic and public positions by many men in an attempt to bring various inventions before the public and at the same time prevent private monopoly has been to secure patents as matter of record and then throw them open gratis for public use. This procedure received official recognition in the United States Patent Act of March 3, 1883, which authorises the remission of all patent office fees to Government officials on patents bearing on their face permission for everyone in the country to use the invention without the payment of any royalty.

Practice has shown, however that this does not accomplish all that had been hoped for it. A certain minimum amount of protection is usually felt necessary by any manufacturing concern before it will invest in the machinery or other equipment, to say nothing of the advertising, necessary to put a new invention on the market. Thus a number of meritorious patents given to the public absolutely freely by their inventors have never come upon the market chiefly because, "what is everybody's business is nobody's business."

If some of these patents, on the other hand, were placed in the hands of such an organization as the Research Corporation, it could study the situation and arrange licences under fair terms so as to justify individual manufacturers undertaking the introduction of the inventions, and at the same time would be accumulating from the royalties funds for further investigations.

As to the details of organization the Research Corporation was incorporated on February 26, 1912, as a Stock company under the laws of the State of New York, with its office at 63, Wall street, New York city, its declared purposes being—

(a) To receive by gift and to acquire by purchase or otherwise, inventions, patent rights and letters patent either of the United States or foreign countries, and to hold, manage, use, develop, manufacture, install and operate the same, and to conduct commercial operations under or in connection with the development of such inventions, patent rights and letters patent and to sell, licence or otherwise dispose of the same, and to collect royalties thereon, and to experiment with and to test the validity and value thereof, and to render the same more available and effective in the useful arts and manufactures and for scientific purposes and otherwise.

(b) To provide means for the advancement and extension of technical and scientific investigation, research and experimentation by contributing the net earnings of the corporation, over and above such sum or sums as may be reserved or retained and held as an endowment fund or working capital and also such other moneys and property belonging to the corporation as the Board of Directors shall from time to time deem proper, to the Smithsonian Institution, and such other educational and scientific institutions and societies as the Board of Directors may from time to time select in order to enable such institutions and societies to conduct such investigation, research and experimentation.

(c) To receive, hold and manage, and dispose of such other moneys and property, including the stock of this and of any other corporations, as may, from time to time, be given to or acquired by this corporation in the furtherance of its corporate purposes and to apply the same and the proceeds or income thereof, to the objects specified in the preceding paragraph.

As practically all technical work under the corporation's supervision will be done in co-operation with either industrial works on the one side, or school and college laboratories on the other, its expenses will be chiefly administrative, and were estimated for the first year at $10,000, the expectation being that after this it would be self-supporting. As a margin for unforeseen contingencies, the capital was placed at $20,000, divided in 200 shares, of a par value of $100 each, and issued under the condition that "no dividends shall be declared or paid thereon, and the entire net profits earned by said capital stock shall be applied to or expended for the aforesaid purposes." All stock issued is also under an option to the corporation by which the latter may at any time through its Board of Directors repurchase it at par, and the stock cannot be otherwise sold, without first notifying the Board and allowing the latter an opportunity to exercise this option.

The Directors who need not be stockholders, are 15 in number, seven constituting a quorum, and are elected for a period of three years, one-third going out each year. They in turn elect each year an executive committee of five, of which three constitute a quorum.

It is not proposed to fill the offices of President and Manager until the work of the Corporation is well under way and the permanent demands and responsibilities on these officers can be better estimated, their duties devolving in the meantime upon the Vice-President, Chairman of the Executive Committee and Engineer.

The present organization is not considered as necessarily permanent in all its details but was deemed the most simple and generally expedient for carrying out the initial stages of this experiment in economics, at least until it should have earned a safe working surplus of its own and demonstrated its ability to produce a substantial permanent revenue. It will then devolve upon the Board of Directors to decide upon a definite policy for the ultimate control of the corporation. This may be done by exercising the option to repurchase all outstanding stock at par and then proceed to redistribute the same, as for example, by turning the whole over to the Smithsonian institution, or perhaps better still dividing it among a number of universities and similar institutions.

This, of course, does not mean that the particular institution so selected would thereby acquire any more direct claim on the profits of the corporation than others, since the stock is non-dividend bearing, but merely that they would become trustees responsible for the election of Directors who would give the corporation a business administration, thoroughly practical but conforming to the idea implied by its objects and associations.

The terms under which each new patent shall be acquired by the corporation are entirely in the hands of the Board of Directors, but at least for some time to come it is probable that only such patent rights will be primarily considered as are offered freely without restrictions as to mode of administration or obligation of any financial return from the corporation, as present indications are that the latter will find itself well occupied even by these offers alone.

The Board has authority to purchase patents where this may appear as good business policy, which may quite conceivably occur from time to time in rounding out fields in which it has already embarked. Contracts with owners of patents for administrating the same on a profit sharing basis will probably not be considered, chiefly owing to the unforeseen complications which it is easily possible, not to say certain, that such agreements would eventually lead into as the further developments of different interests began to overlap.

A much simpler, safer and more expedient procedure appears to be for the patentee to retain if he so chooses complete title and control of his patent in certain geographical territory while assigning the same in other territory entirely unencumbered to the corporation. Any development which the latter can give it will then automatically enhance the value to both.

The procedure is well illustrated in the case of the first patents to come into the possession of the corporation, viz., those referred to above as initially offered to the Smithsonian Institution itself. The owners of these at the time of their original offer had already spent considerable time and money in their development but from the outright sale of their foreign rights and the rights of six western states (California, Oregan, Washington, Idaho, Nevada and Arizona), together with a licence for the one industry of Portland cement manufacture throughout the whole United States, they felt adequately remunerated for their work and financial risks, and were willing to turn over all remaining United States patent rights as a nucleus for the experiment in economics which the Research Corporation represents. Together with this came to the corporation a 10 per cent interest in the net profits of the parties who purchased the rights for the western states and for the cement industry, while incidentally growing out of the negotiations on the foreign rights, another set of valuable patents has come to the corporation from Mr. Erwin Moeller, of Germany, which emphasizes in a most practical way the fact that academic organizations and particularly the Smithsonian Institution are international in spirit, and so recognized by scientific men the world over, presenting at once a nucleus from which may well be developed many activities leading towards world consciousness, co-operation and peace.

The present movement, as stated, had its inception on the far western edge of this continent in very unpretentious beginnings, but has already overrun national borders both in the character of its work and the personnel of its supporters. It is a question which should peculiarly interest this Congress as to how far and in what way international co-operation can best be assured in such activities which from their very nature and aims should from the outset transcend political boundaries and national pride and be treated by one and all from a standpoint as broad as humanity itself. It was with this in mind that the present paper has been presented, not so much as a record of present achievement, as to stimulate discussion and co-operative effort toward ever wider and more effective activities in this most promising field.

Remarks by Dr. Gilbert J. Fowler.

I find that the scheme has been worked in connection with the Mellon Institute in Pittsburgh which was founded for the promotion of industrial research. I enclose herewith a cutting descriptive of that institute. I have been personally in touch with their work on smoke prevention research and can testify to its great usefulness.

EXTRACT FROM THE "EFFICIENCY MAGAZINE."

The Mellon Institute.

What we need, to develop industrial chemistry, in a quick practical way, is an institute like the Mellon Institute, Pittsburgh.

The Mellon Institute was built by private professors of chemistry; and it was paid for by two Pittsburgh bankers—Messrs. Andrew William Mellon and Richard Beatty Mellon.

The plan of it was originated by Professor Robert Kennedy Duncan, a Canadian scientist. Unfortunately he died before the building was completed. The present Director of the Institute is Dr. Raymond F. Bacon. The address of the institute is Pittsburgh, Penn., U.S.A.

Dr. Duncan established the institute in 1911 in a temporary building which cost £2,000. The present building cost about £60,000 and is maintained at a yearly expense of £30,000.

There are at present over forty chemists at work in the institute solving the practical problems of manufacturers.

Suppose, for instance, that a manufacturer wishes to know the chemical nature of glue, he agrees to pay £800 a year for two years to the Mellon Institute. The institute then secures a chemist who is well fitted to work out this problem. The results belong to the manufacturer who pays the money.

In this way a manufacturer can secure results for a few hundred pounds, instead of spending thousands of pounds on a laboratory of his own.

Some of the subjects that are now being studied in the Mellon Institute are as follows:—petroleum, yeast, leather, fertiliser, radiators, turbine engines, fatty oils, acetylene gas, dental supplies, stone, glass, soap, aluminium, copper, laundrying, bleaching, etc.

In 1915 the total amount paid to the institute by manufacturers was £15,000. As to results, I may say that more than thirty valuable patents have already been secured by the institute.

WITNESS No. 269.

DR. J. J. SUDBOROUGH, PH.D., D.SC., F.I.C., *Professor of Organic Chemistry, Indian Institute of Science, Bangalore.*

NOTE.—*Witness did not submit written evidence.*

ORAL EVIDENCE 13TH FEBRUARY 1917.

NOTE.—The revised list of past and present students of the Institute will be found in the written evidence of witness No. 266.

Dr. E. Hopkinson.—*Q.* You were present in the room when Drs. Fowler and Hay were examined?—*A.* Yes.

Q. So, it is hardly necessary to go over the same ground again, but are there any points in the answers of Drs. Fowler and Hay that you take exception to, or would like to supplement?—*A.* There was the point that you brought forward about having an Imperial Service. A man having a certain rank, and then being sent off on special duty and getting special pay and then reverting back to his original rank,—I do not think I altogether agree with that.

Q. It is not necessarily the original rank. There might be some method of automatic promotion. There might be a time scale?—*A.* I think if a man goes out and spends five years and does really good work and is getting a salary of Rs. 1,200 a month, he cannot go back to his original appointment, that is, on Rs. 600 or something like that.

Q. Dr. Fowler made a point which emphasised the need that promotion might be by merit only. You agree?—*A.* Yes.

Q. There was one question that I wanted to ask which Dr. Fowler suggested might be put more properly to you. That was as regards the publication of any research work done in the institution. What is the system now in vogue?—*A.* The usual procedure is that when a piece of work is finished it is written up and sent in to the Director with the request that it should be printed in the Journal.

Q. The Journal is published quarterly?—*A.* At irregular intervals. Every piece of work forms a part. It may be a couple of pages or twenty pages.

Q. Who determines whether any particular work is worthy of publication in the Journal?—*A.* I suppose at present the authors.

Sir F. H. Stewart.—*Q.* Who edits it?—*A.* It is not edited at all. The author is entirely responsible for the paper. It is not a Journal in the ordinary sense. It is similar to the American and Canadian University publications. Each part is an account of a piece of work which is published under a certain name and that person is responsible for that part.

Dr. E. Hopkinson.—*Q.* Has the Journal any wide circulation?—*A.* It is sent out to all the Indian Colleges and to public bodies in India and libraries.

Q. It is rather too early to ask the question, but do you think that up to the present it has served a useful purpose?—*A.* I think that the papers that have appeared in the Institute Journal have appeared either previously or subsequently in some well-known scientifical periodical journal.

Q. Is that so?—*A.* Yes, with a single exception, I think every one. Of course, one can say that up to the present a great majority have been more or less of a purely scientific nature and they have not been in the nature of research work in applied chemistry, but subsequently there is no doubt that there will be a number of publications about research work in applied chemistry.

Q. I want to ask you some questions as regards the students who pass out of your laboratory. Have the places which they occupy been found for them, or have they got them on your recommendation, or have they gone on into the world and got the appointments of their own accord?—*A.* They vary considerably. Three or four of them already held posts before they came here. They were lecturers or professors in Indian Colleges and they simply came here and the time varied from six months to two years and then they went back to occupy their original posts. In the other cases, I think they have seen the posts advertised and applied for them and get them in that way. One or two applications have been made to me as to whether we had any one suitable for a particular post and the students have got appointments in that way, but it is only comparatively recently that this method of procedure has come into force at all.

Q. You have not experienced the difficulty that Dr. Hay experienced, in that the students were not sufficiently prepared to be able to take advantage of the research work?—*A.* One cannot say that. They have, of course, been graduates and some of them even M.A.s. Beyond the ordinary B.A. or B.Sc. course, with three months in our laboratories, they will be quite fit to undertake conjoint research. All of them were graduates in chemistry. We would not take men who knew no chemistry.

Q. Will you be kind enough, as Dr. Hay is going to do, to take this list which has been prepared under Dr. Bourne's directions and supplement the last two columns, "Academic qualifications, and remarks about their future work"?—A. That is, the work subsequent to leaving the Institute.

Q. And whether you think they were really doing good work?—A. Yes; in a great majority of cases, at any rate.

Q. How far have you found that they are fully qualified to take advantage of the work?—A. One could say straight off that they are all qualified to profit by the work here.

Q. Do you hold your professorship under agreement?—A. Not a formal agreement, but simply a letter from the Director stating that I was appointed under the existing by-laws.

Q. These by-laws can be, or probably have been modified?—A. They have been modified somewhat, but not to a great extent.

Q. And under the by-laws you are quite at liberty to take up outside work?—A. Yes.

Q. Do you trust entirely to your own judgment as to whether it is suitable and in the interests of the Institute that you should take it up, or do you consult the Director?—A. I rely entirely on my own judgment and the Director knows, I think, in most cases.

Q. You refer it as a matter of courtesy rather than as a matter of obligation?—A. I consider the head of the department is quite justified in deciding these kinds of things.

Q. And in general terms, what is the nature of the private work that you undertake?—A. It varies considerably.

Q. Is it, in general, for public bodies or private concerns?—A. Both. The bulk of it is for private firms or individuals, but occasionally for the Government of Mysore. We are doing consulting work for the Government of Mysore for the sandalwood factory.

Q. You know we had a long discussion with Dr. Fowler as to the difficulty that might arise from the fact that the results of such work are the property of the firm. Have you found any difficulty in your experience in that way?—A. No. I have found no difficulty whatever. But I conceive that there might be some difficulties unless we had some perfectly definite understanding with the firm.

Q. Do you endorse what Dr. Fowler said about the propriety, quite apart from any existing arrangement, of fees derived from such a work being apportioned in some way between the Institute and its Professors?—A. They ought to be, and they are to some extent. There is nothing formally laid down, but, of course, if we had a piece of work which involves the use of the Institute's material, that would be refunded to the Institute.

Q. Dr. Fowler said that there should be an actual sharing?—A. It was 25 per cent or something like that, which was supposed to cover the expenses.

Q. It varies according to the nature of the work?—A. Yes. I do not think essentially there is any difference between the two.

Q. As a general proposition, apart from any existing arrangements, do you think that such a division of the remuneration from private work between the Institute and the Professor is desirable?—A. Yes. I see no difficulty. It is very little different from what does exist at present, except that you lay down the exact proportions. It is a suggestion I made to the Council of the Institute 18 months ago, but they would not listen to it then,—that a certain proportion of any fee received by a member of the staff doing work which involved the use of the laboratories should go to the Institute and should be fixed and definite.

Q. The Council objected to it?—A. The Council said that it was not worth taking up that point because the amount of such work was limited and small.

Q. You are quite in agreement with Dr. Fowler on that point?—A. Yes.

Q. Will you tell us what your academic career was before you took up this professorship?—A. I was senior lecturer at Nottingham University College for six years and Professor of Chemistry in the University College of Wales, Aberystwyth for ten years, and then I came out here.

Q. Have you ever been in any Chemical Works?—A. No.

Q. Have you had any special experience in the chemistry of dyes?—A. No. I cannot say that I have except for a short time when Dr. Marsden was here. We did a little work on some indigenous dyes.

Q. Supposing a calico printing industry were started in India, could it derive any assistance at all from the Institute of Science here?—A. You mean as it exists at present or as it might be modified? As it exists at present, I think there is no probability. I do not think there is any one who is an expert in calico printing. We might be able to give scientific advice on some of the points that arise. If you want advice from a man who is an expert in calico printing, there is no such man at present to go to.

WITNESS No. 270.

DR. H. E. WATSON, D.Sc., A.I.C., *Professor of General Chemistry, Indian Institute of Science, Bangalore.*

NOTE.—*Dr. Watson did not submit written evidence.*

ORAL EVIDENCE, 13TH FEBRUARY 1917.

NOTE.—The revised list of past and present students of the Institute will be found in the written evidence of witness No. 266.

Dr. E. Hopkinson.—*Q.* Would you be kind enough to tell us what your academic and professional career had been before you came out here?—*A.* I was for five years at University College, London, and while there I was demonstrator for three years. I then went to Berlin and Geneva and to Cambridge with an 1851 Exhibition scholarship. From Cambridge I came straight out here as assistant Professor of General Chemistry.

Q. What did you do in Germany?—*A.* Physical Chemistry with Professor Nernst. I went abroad more with the idea of studying the methods of foreign Universities than with the idea of completing any particular piece of research work. I only stayed six months in Berlin and as a matter of fact I worked out the essential details of an important piece of work which was finished off by a German. I was at Cambridge for a year. I was working at the Physical Laboratory under Sir J. J. Thomson.

Q. What sort of work were you engaged on there?—*A.* I was investigating the electrical properties of gases. In fact, most of my time before I came out here was spent in dealing with the properties of gases. I came here straight from Cambridge as assistant Professor and last year I was appointed Professor. Dr. Sudborough and I are working together in general and organic chemistry.

Q. You have only five students between you according to this list?—*A.* Yes. There are also three extra men who are not exactly students.

Q. Will Dr. Sudborough give us full information about these students?—*A.* Yes.

Q What is this list of special students?—*Sir A. G. Bourne.*—*A.* They are here for a short time. Under our present by-laws we have certain rules dealing with students who come to us. We exempt certain men from the rules and put them under special rules. We call them special students. There is no meaning in it except that they have been here for a shorter time than the others.

Q. They work on a particular subject and then go away?—*A.* Yes. They were not students in the sense that we have called on them to make a deposit which we require from the ordinary student. They are workers rather than students.

Q. What about Dr. Marsden?—*Witness.* He came to the Applied Chemistry Department when Dr. Sudborough and myself were looking after it in the absence of the Professor and he carried out certain experiments on indigenous dyes in our laboratories.

(*Sir A. G. Bourne.*)—I should not have called him a student. He came to work there.

Witness.—We have had a good many professors coming and working here during vacation and taking advantage of the facilities provided.

Q. I understand that Dr. Sudborough and you are doing no regular class work?—*A.* We do not deliver any lectures. I have given two short courses of lectures on subjects that might be of use to students, but there is no regularity. We also have a colloquium. One man reads a paper and we get others to discuss it as far as possible.

Q. I should like to ask you whether you think that men who come from Cambridge to India would regard it as more attractive to be a member of an Imperial Government organisation and through it to take up such posts as you now occupy, than to come direct to the Institute, being under no obligation to any one but the Institute and at the same time having no prospects of advance in an Imperial service, the prospects being personal, entirely dependent on the work done at the Institute?—*A.* I think, as far as Government or other service goes, the ordinary man at home is not able to realise the precise difference. He is too ignorant of the conditions out here. One important point I think is the question of pension. I think people would, in general, come out to posts to which a pension, however small, is attached in preference to those offering no pension. When I came out I was appointed for three years and I was very strongly advised in England not to stay longer than three years, but I have stayed longer. That was the impression at the time—that it was a very bad thing to come out to India at all, and I think that is one of the difficulties that will be experienced.

Q. You think that it is now the general feeling that it is a bad thing to come out to India?—*A.* Yes.

Q. Because it is a blind alley?—*A.* Simply on general principles. I do not know why it is, but very few people that I know at home would dream of coming out here. I am sure there will be great difficulty in getting fully qualified men to come here unless every inducement is held out to them. We have already experienced this difficulty at the Institute of Science. Quite a number of men who were considered suitable for certain posts, have refused all offers without hesitation. I think it is often mere ignorance. I know it was in my own case. I knew nothing of the country.

Q. You are now under an agreement?—*A.* Since last year I have been under an agreement, which is for three years.

Q. And there is no obligation on either side after that?—*A.* No.

Q. Do you regard that as a disadvantage?—*A.* This particular agreement was drawn up, I fancy, under rather peculiar circumstances.

Q. Do you think in general that it would be regarded as a disadvantage to take up a professorial chair if the appointment is for a definite term?—*A.* Certainly. It would be regarded as a great disadvantage.

Q. You think that will be the general feeling?—*A.* Yes.

Q. I could give you many instances to the contrary, but still I want your opinion?—*A.* That is certainly my impression. Personally, I should not like to take up an agreement for a short time if I could possibly avoid it. As far as I can judge, it is almost impossible to avoid losing touch to a large extent with people in England, and this would make it exceedingly difficult to obtain any appointment in England after spending some time in this country.

Q. Your education has been carried on in different schools of chemistry. Looking at the thing from the point of view of students, do you think that it is advantageous for any professor to continue indefinitely in one chair?—*A.* So far as elementary teaching of students goes, and not research.

Q. I think you may properly differentiate between teaching and research in your answer to the question if you wish to do so?—*A.* I think, as far as research goes, that it is very advisable to have one man in the same place. Although a good man will always attract research students wherever he goes, it would be most unsettling to a professor to be liable to be moved at any time. Even when thoroughly equipped laboratories are available, I should consider each move as equivalent to the loss of at least one year's work.

Q. You think that the research professor might properly be a life appointment or till fifty-five years of age?—*A.* If you could get a good research professor, yes. From the practical point of view there is a difficulty. If you appoint a man for life you cannot get rid of him. From the professor's point of view permanent appointment is the only one which will induce a good man to come out to India.

Q. Have you any practical suggestion to meet the difficulty which you have now referred to?—*A.* I think a good deal would be effected by having a very large chemical department in which the indifferent men could be employed without giving them posts of greatest importance, whereas a good man would come to the top automatically.

Q. You would have this situation, that a certain professor might be indifferent, but still hold a chair of equal rank with the active and successful professor?—*A.* I think another way would be to appoint the men, as far as possible, when they are young and not to give them a chair until after due trial and approbation. For instance, one could appoint a man out here on Rs. 500 to 800 to start with and let him understand that his subsequent promotion would be in accordance with merit.

Q. That could easily be done with younger men, but you cannot do it with men with more or less established reputation?—*A.* Is it necessary to get men of established reputation? Personally I think not. If I might suggest, there are certain industries, which are well known already that are to be developed. Oil pressing is a well known industry in England. If it were determined to start oil pressing here, there would be a certain amount of research work to be done in connection with it. On the other hand a great deal of work would undoubtedly be saved by obtaining the assistance of a man who had devoted his whole life to oil pressing. Such a man would not come out as a professor on Rs. 1,000 or 2,000 a month, but he would want an exceedingly big salary. On the other hand, he might be quite willing, for a definite fee, to come here for a very short period, and explain to the permanent staff the salient features of the industry and the chief practical difficulties. In that way one could get the best advice without paying fabulous sums to older men and keep the younger men as permanencies as far as possible. We have an excellent example in what Messrs. Tata have done on a commercial scale and we might try to imitate them—by getting the very best man. No institution, however well equipped, would be able to pay such a man permanently.

Q. Were you here when Dr. Fowler was examined? Is there anything which you wish to say about which Dr. Fowler has spoken?—*A.* On the question of consulting practice, I think that if there were to be a large chemical institution private consulting practice would be exceedingly harmful.

Q. There will be competition?—*A.* Not so much competition, but in my view the advantage of a large department would lie in having as far as possible an expert in every branch. You would have men who know all about one thing, even quite a minor point, and naturally if anything of that sort came up it should be sent to that particular man. We have an example now. The Mysore Government have asked us to investigate some refractory materials. I am doing it. I admit that I know very little about refractory materials, and I can only apply general scientific principles. There is a man at Bombay who has spent his life on refractory materials. If he was at the Institute he would naturally take the work up. Supposing though we were both at the same institution and some one asked me if I would undertake this examination for a fee, I might be tempted to do it myself instead of handing it over to the man that could do it. In that way I think that there would be a great loss of efficiency.

Q. That would be met if, instead of a division of the fee between the Institute and the particular professor, there was some system of pooling?—*A.* Why should not the whole of the fees be paid to the Institute?

Q. You think it would be better?—*A.* I think so; especially regarding the work from younger men, there will be no trouble whatever, but if you have a man who has an established reputation and who is a consulting chemist at home, he will probably not give it up. Under the by-laws we are allowed to take consulting fees. This did not mean anything to me at all when I was first appointed. I attached absolutely no importance at all to it, and I do not think the ordinary young man would.

Q. Your plan, I take it, will be rather to have a fixed stipend for the present staff, any fees derived from outside work to go straight to the coffers of the Institute, and to rely very largely on young men for recruiting the staff, and to supplement it wherever necessary by getting men of established reputation for short periods for special purposes?—*A.* Yes. With regard to consulting work, no doubt, it would be necessary to send a man on occasions from the central institution to do work actually at some factory, and in that case I think it might be reasonable to give him an extra allowance. You would select the best man for that job naturally and in that way he would get some reward for being above the others.

Q. Are there any other points on that line of enquiry which you would like to enlarge upon?—*A.* I think a very important question of recruitment is the stability of the appointment in one place. I believe that there was some talk of amalgamating some central institution with the existing educational services. A man might be very pleased to come to India to do research work, but if he knew that he was likely to be turned on to teaching pure and simple, he would fight shy of the appointment. I would suggest however that in practice some arrangement could be made without difficulty because there would be, no doubt, a number of men volunteering for teaching work. In the institution you will find men if you pay a little more who would be willing to go to another place and do teaching work, but if every man knew that he was liable, without option, to be sent away to do work of another nature, recruiting for the staff would certainly be adversely affected. Another great factor is climate. It is almost essential to have a cool climate for a central institution. I think the amount of work turned out would be two or three times what it would be if the climate were too hot.

Q. You personally think that the climate of Bangalore is satisfactory?—*A.* Yes, I have always been here during the hot weather and I find that I could do much more work in the cold weather than in the hot weather. Notwithstanding, I could do some work in the warm weather, but I should not like it to be very much warmer. In the hot weather one does not feel energetic and undoubtedly the output is very much diminished.

Sir F. H. Stewart.—*Q.* How long have you been out?—*A.* Six years.

Mr. A. Chatterton.—*Q.* I have only one question in connection with the reply that you have just given in regard to the chemical staff—the giving of fixed stipends and not being allowed to take private consulting fees. How will you arrange in cases of the kind in which an industry, say, for instance, a soap factory, wants to have the advantage of an expert chemist from the Institute of Science as a permanent consultant?—*A.* It will work in exactly the same way. Instead of paying the individual you would pay the Institute so much and they would send the man. If the manager of the factory was dissatisfied with the man he would ask the Director or whoever was responsible to send some one else.

Q. Do you think that it would work more satisfactorily than an arrangement made between the consultant and the firm?—*A.* There is a certain type of men with whom it would not work so well, but I think ordinarily it would work. As I was suggesting just now, the man, if it involved his living in another place, might get an extra allowance.

Q. Don't you think the fact that the man could get a certain amount of money by private practice is an additional stimulus?—*A.* It is to some people, but if he could get promotion from one grade to another by doing good work I think that would have some effect.

Q. In case where the work is carried on in the factory, you can lay before your consultant chemist a certain problem and after he works at it, he gives a solution. If the man had a more definite interest in the place, he might go further and continue to work on the problem?—*A.* I think it depends very largely on the type of man. I am quite willing to admit that there are many advantages in allowing private consulting work, but from what I have seen so far, I consider that these advantages are greatly outweighed by the disadvantages.

Q. The type of man is the man to develop industries, to push on technological work. He is not purely a scientific man who will take up a problem and deal with the purely scientific aspect?—*A.* I think the Government Agricultural Department does that to a certain extent. They do not get any better pay for developing crops and so forth. I do not know whether they would be any the better if they were so paid.

Mr. C. E. Low.—*Q.* When did you first begin to have private consulting practice? When did it first come in your way?—*A.* I cannot say very definitely. I fancy some samples were sent for analysis.

Q. What work were you mainly engaged on before private consulting practice came to you? What types of investigation?—*A.* I was doing a good many different types. I was doing some purely scientific work.

Q. The point of my enquiry is this. Has the picking up of private consulting practice been to give a distinctly industrial bias towards the work coming to you?—*A.* I do not think so; I was doing work of an industrial character some time before the question of fees arose. At the same time, I am doing very little purely scientific work now because I consider the problems of an industrial nature which are sent in—not necessarily paid for—are of more urgency than the purely scientific work which I was doing before.

Q. Had the work which was sent in an industrial bearing?—*A.* All the enquiries that we have have some bearing on industries, or are in some way connected with industrial work. They involve mostly the analysis of samples.

Q. Is the work of industrial bearing tending to crowd out purely scientific work?—*A.* I think certainly at present, because we consider it more urgent. If there was a larger staff I do not know that it would. I should like to point out that it is not entirely private consulting work. For instance, the question which has been referred to us by the Madras Government on oil seeds, which they consider very urgent,—that is not private work in any sense, but we should certainly give that question precedence.

Q. What I meant was this. Did the coming in of a great deal, or a certain amount, at any rate, of private consulting work which is of an industrial character tend to give an industrial bias to the work generally? Did it tend towards taking up more industrial work, not necessarily of a private nature—the fact of the man being in contact with manufacturers and manufacturing interests?—*A.* I do not think so. As I said before, we considered industrial work as the more urgent, and also very little interest has been shown by outsiders in pure science. For the sake of advertisement it was necessary to attract their attention. Actually I should say that the thing which has given the greatest impetus to the present work which is being done at the Institute and which is nearly all of a technical nature, was the taking up of the distillation of sandalwood oil. That was not done as private work. Originally we were simply asked to investigate the distillation of sandalwood oil by the Mysore Government and we did that, and later on the Government asked if we could assist in the factory and for that they offered a fee, but the first part of the work was in no way private.

Q. You think it is desirable for the Institute to be as much in close touch as possible with manufacturing interests?—*A.* Yes.

Q How do you think that it should be achieved?—*A.* I should say that the person who should bring the work to our notice is the Local Director of Industries and we could then report on the technical aspect as to whether we would be likely to do anything with it or not.

Q. You realise that the Director of Industries is at present very much more concerned with small industries and cottage industries and he has really nothing to do with big organised industries in the Province? Supposing we have a Director of Industries in Bengal, I imagine that it will be a very long time before the coal, or jute, or steel making trade go to him. They are much more likely to go to you direct if they can see any way of getting help from you?—*A.* In referring to the Director of Industries, I was rather thinking of Government industries, if Government wished to develop any new industries. As far as private work goes, it is merely a question of advertisement. We do not want to get too many demands for work before we could satisfy them. We are getting questions further and further afield, and I think after a very little advertisement everybody will be inclined to ask for advice if they have one or two practical tests that we can really do something useful.

WITNESS No. 271.

MR. G. A. MAHAMADI, B.A., F.C.S., *Soap Expert with the Government of Mysore, Bangalore.*

WRITTEN EVIDENCE.

I graduated from Bombay University in 1904 and joined the Agricultural Department of Central Provinces and Berar in 1905, when I learnt agricultural chemistry at the Imperial Agricultural Research Institute, Pusa, for sixteen months. Later on I served as an Assistant Agricultural Chemist in that province for $4\frac{1}{2}$ years. In 1911 I went to England as Government of India technical scholar to study the advanced processes connected with the industry of oils, fats and their products. I stayed out for 3½ years, during which period I worked for one year in the City Soap Works of Messrs. D. W. Gibbs, Limited, Wapping, East London, and later on spent about four months in the United States of America where I worked in a cotton oil mill and a refinery, learning the crushing of the seed and the refining of the oil. Apart from this work in regular factories I worked in the chemical laboratories of different Polytechnics and visited quite a large number of soap works, oil mills and margarine works in Great Britain, United States of America and Germany.

I returned to India in January 1915 and tried to join the Berar Oil Works Limited, Akola, Berar (my home) which own an up-to-date plant for crushing cotton seed though badly set and erected. They had no technical man for their work, their skilled staff consisting mainly of a good mechanical engineer, and I thought I could introduce some improvement in the concern by helping them to produce a better quality of oil and use their "Foots", obtained as by-product in refining the oil, for making some soap for the market. All that meant some investment of money and I believe their financial position did not encourage them to entertain my services.

In May 1915 I went to Cawnpore to see the Premier Cotton Oil Mill of that place and happened to meet there one Mr. Shawaksha, a Superintending Engineer who had just retired from service and who wanted to go into some business. I explained to him the prospects of a soap factory in Cawnpore. I met him later on, by appointment, in Bombay in July with all my papers and discussed with him the whole proposition of a soap factory in consultation with another friend of his. His first trouble was whether I could do all that I said, in other words, whether I could make soap. I volunteered to make some experimental batches of soap and offered to find a suitable place for that purpose in Cawnpore. From his conversation I could also gather that as there are not very many soap makers in India, his factory will to a great extent, depend on me, which he did not like though I suggested ways out of this. Ultimately he wrote to me in Amraoti, Berar, stating that it is an up-hill task and will require very energetic work on his part for which he was not prepared.

Later on I tried to interest the capitalists in Nagpur through one Mr. Dick, Bar-at-law, to erect an up-to-date cotton oil mill and a refinery there and prepared a statement showing the prospects of such a concern. That attempt failed and it seems to me that the unsatisfactory condition of the Berar Oil Works, Limited of Akola had something to do with discouraging the capitalists there.

From January 1916 I am working on soap manufacture at the Indian Institute of Science under the Mysore Government. The soap made by me was considered a commercial product by the authorities and a factory was contemplated to be erected, though it is not yet done owing to the dearth of machinery.

Lately it is known that the machinery from England which was ordered long ago might not come till the war is over and the present Director of Industries and Commerce of the Mysore State is contemplating to make some locally.

Though during this period of my work on soap I worked on a very small scale and with crude appliances I was able to demonstrate the process of manufacture and the quality of soap that could be turned out. And I may state that this much demonstration has been sufficient not only to satisfy the Mysore Government about the soundness of the proposition of a soap factory but has even convinced the private capitalists who have actually approached me with a view to organize a company for soap-making with my help, if possible.

Though my experience of industries in India as stated above is very limited, it has led me at least to the following conclusions:—

(a) That the Indian capitalists, at present at least, do not fully appreciate the value of technical help in a manufacturing concern and as such, are not willing to pay it adequately.

(b) There is a fairly large amount of capital in the country, particularly in small holdings, available for investment in industries, but the holders are not eager enough to take new industries until the soundness thereof is proved in some practical form.

(c) In the interests of the development of industries in India it is essential that no new enterprise should be undertaken unless it is to be done in a thorough way and under expert technical advice.

Things will remain as they are, unless there is an organized effort to correct them. Such an organized effort can only bear fruit if it is based on complete co-operation between the public and the Government, the latter taking the initiative and carrying out the necessary plans laid down in consultation with the Advisory Board, to be constituted from amongst the former. The initiative of the Government should take the form of the immediate establishment of a Department of Industries and Commerce in each Province with a keen business man at its head and a good staff of technical men.

Technical aid.

Technical skill is one of the most important factors in the success of a manufacturing concern and consequently the foremost duty of the Department of Industries and Commerce in every Province should be to procure technically trained persons for various industries and to see that they are utilized.

The question of getting technically trained persons for Indian industries is rather a complicated one and requires thorough investigation and laying down of definite principles on which to work. To start with, a new enterprise in any country is always undertaken cautiously and is developed only in the light of experience. This is more true particularly when private people with small holdings want to undertake it. Their first desire is to work a small commercial plant and to see how it goes. And in order to make it a commercial success they naturally desire to prevent waste and to use bye-products in a scientific way. As most of the industries that are desired to be established in India and for which there is field will be more or less new enterprises for some years to come at least, they will only germinate and grow on the lines stated above. For them, therefore, will be required technical men who should not only be scientific men but who should at the same time be well-versed in the manufacturing details of the main products as well as the bye-products of their different industries. In other words, they should be all round men for their particular industries. Such men cannot be had ready made. They will have to be trained. In European countries, industries are so far developed and carried out on such a large scale that a large number of persons supply the technical help required by a certain work. As such, each of them becomes a specialist in his line but knows nothing about other branches. In the Soap Works of Lever Brothers, Port Sunlight, for example, a chemist may have worked for half a dozen years and still may not have done more than analyzing certain kinds of oils only. He may not only know nothing about the boiling of soap or the making of toilet soap but he may not even have got the chance of doing analytical work in all its branches. In the U.S.A. a man may be good cotton oil mill's manager but he may know nothing about the refining of the oil, or the one who refines the oils may be ignorant of making soap out of "Foots" a bye-product, or making margarine out of his refined oil. Persons who know all the branches of their particular industries are scarce in European countries and where they are, they are too much valued in their own country to come to India. They become there Works' Managers which is a very big billet. Indian industries owing to their modest start, cannot entertain the services of such men. For them, therefore, as stated above, men will have to be specially trained, keeping in view the needs which they are expected to supply. Such men should preferably be selected from amongst the Indian chemists and mechanics who have studied their subjects well in India and have shown marked tendencies towards practical work by continuing to get experience in their respective lines in established works and institutions in India.

Government of India technical scholars.

The Government of India have already an institution to send a certain number of Indian youths every year to foreign countries for technical education. That is a step in the right direction. It is, however, said that these technical scholars have not been able to do much useful work in the regeneration of industries in India. There is some truth in this statement but it is not the fault of the Indian student. In the first place, he does not get a full chance to learn the industry for which he is selected. He is put, on his arrival in England under the guiding control of the Educational Adviser, India Office, whose knowledge of facilities for learning industries does not extend beyond certain public institutions and Universities which the students are persuaded to join. In the absence of any arrangement to get practical training in factories, which is invariably insisted upon by practically every student and usually declared impracticable as a rule, the student, perforce, joins the University or the polytechnic, puts in his two or three years and returns to India with scientific training in the principles underlying the manufacturing processes of his industry, but no practical training in the processes themselves. The result is that he is no good for industries, because there is no need of such a scientific man in them, as they are at present. They want a man who should be of practical use to them in enabling them to make a thing which they could sell, and not one who has got a number of theories and not very much sure which of them is the best.

In order, therefore, that these students should be of real practical help to industries in India it is essential that in foreign countries they should get a fair chance of learning their industry by working in factories. They should have a good knowledge of chemistry or good practice in mechanics before they are sent to foreign countries. This knowledge of theirs will enable them to intelligently follow the evening courses of lectures and practical work in the Polytechnics and supplement their practical factory work with the scientific training thus obtained.

The question, then, arises as to how to get this admittanee in factories for these Indian students. I may suggest and I believe it is quite practicable that this should be done by the India Office. The India Office purchases considerable stores in Great Britain and the firms which are thus patronised should be required to take a certain number of the Indian students for training every year. The Japanese Government acted on this very principle and got an army of trained technical men who have rendered so much help to their industries.

The most important work of the Department of Industries and Commerce in every province should consist of using these trained technical men in organizing new industries and developing the old ones in consultation with the Provincial Advisory Board of Industries.

The best way of doing this will be to keep these scholars for one year more in the pay of the Government and during this period they should be allowed to show on a small scale as to what they can do. Public Works Department Workshops and Agricultural Chemical Laboratories in each province should be utilised for this purpose with the necessary expansions till a central well-equipped technical institute, with a workshop attached, may give these facilities. The scholars should at the same time be required to prepare statements based on local conditions regarding the prospects of their particular industries. The Government should help them to organise joint stock companies and may even provide a certain portion of share capital on the same basis as the public subscription. The work done by the scholars which can be seen by the public plus the sharing of the Government in capital will create confidence in the public which will easily attract the required capital of the company.

In certain big enterprises in which this procedure may not be considered sufficient to float a company, the Government should establish pioneer factories. In these cases, of course, their scholars will be of direct use to them and as such should be taken for a certain number of years.

They may also be utilised in giving scientific advice to existing concerns and to train persons who are largely needed in them. This will require their services to be permanently taken by Government.

The scale of pay which I should suggest for these foreign returned scholars for Government service is Rs. 300—20—500 and each one of them before training should be bound to serve the Government in case his services are needed.

Loan of Government experts.

The loan of Government experts should be made to private firms or companies on condition that in case the method suggested by the expert is to be adopted by them, they should pay the Government the expenses incurred by it for the period that the expert worked at the firms. The Government should pay half of this to the expert as an incentive to do his best.

With the above arrangement the firms who have paid for the experts' suggestions should have the benefit of this exclusively for a period of 5 years after which it should be public property.

Imperial Institute, London.

Regarding the Imperial Institute, London, I may say that the main work done by it as far as India is concerned is to analyse her raw products and to try to find a market for them in England. Prof. Wyndham Dunstan is in close touch with the big manufacturing concerns who take up a material on his recommendation based on the analysis which is done in the laboratories of the Imperial Institute, and work it up into manufactured articles; if it suits them they use it in large quantities which means a market for the Indian product. The only benefit therefore that accrues to India by the work of the Imperial Institute is that her raw products find a demand in England. But as far as Indian industries are concerned, the Imperial Institute is absolutely of no use. On the other hand it is detrimental. The backbone of industries in any country is the cheap supply of raw material and if raw materials are in demand by firms which are large enough and rich enough to buy at a price which may not be convenient to the small Indian manufacturer, it is a sure way of turning him out of business. The most peculiar part of this Institute is that Indian revenue is taxed to create this anomalous condition for Indian industries. English manufacturers must have raw materials if they want to keep their big factories running. As such they should pay entirely to investigate the fields of any part of the world from which they want to draw the raw materials. On the other hand the interest of India should be to establish factories in India and to work up her raw materials locally. For this purpose she should not only give no help to the Imperial Institute of London, but establish an institute of that sort in India to help the Indian manufacturers exactly on the lines on which the Imperial Institute is doing work for English manufacturers.

Research abroad.

Research abroad cannot be of much use to Indian industries. The results of the analytical work of the Imperial Institute of London are published in a quarterly bulletin and still I doubt very much if any Indian manufacturer will ever be benefited by it. It is lifeless for an Indian manufacturer and carries the weight of a piece of literature on scientific subjects. In order that these scientific investigations, which by themselves are no good unless taken up by manufacturers, may help industries, they must be made on the spot and their results should be constantly brought to the notice of them. In other words there should be a living connection between the science and the factory.

Indian Institute of Science.

The Indian Institute of Science, Bangalore, with her well-equipped laboratories, is in a unique position to do this service to the Indian industries. And I believe it will be far better and more economic to definitely put the aims of the Indian Institute of ience somewhat on these lines rather than to try there to train students for industries hich, I am afraid, will never be efficiently done. Leeds University, which is a echnical University and which has got far bigger establishments than we can ever xpect here, cannot train a student so as to directly put him into an industry. After University training he must have factory training to know his business well.

With the Indian Institute of Science developed somewhat on the lines of the Imperial Institute and doing research work for industries of India, and with well-equipped technological institutions, having workshops attached to them in provinces, the question of technical research and practice may be considered as put on sound basis.

The provincial technological institutions must have good workshops attached to them. They should be organised somewhat on the lines of the Regent Street Polytechnic or Battersea Polytechnic of London. They should have regular courses of scientific and engineering subjects during the day which should be of a standard to qualify students for some public University examination. They should further have short courses of lectures in the evening in some technical subjects of which there is need in that place. They may also utilise their evenings in teaching certain kinds of arts as well, e.g., drawing painting, brass work, etc. The workshops attached to these institutions should be fitted up with small manufacturing plants of different descriptions where technical experts should conduct experiments for the purpose of proving the utility of their methods and at the same time for giving practical demonstrations to any students or to the public as the case may be.

Government assistance.

Regarding Government assistance to industries in the matter of finance, I think, it should take the form of establishing industrial banks which may bring money within the reach of industries on easy terms. Government should also exempt from excise duties all such articles as are used in industries. The loss of revenue incurred under this head may be recouped from the taxes on the profits of the industries. It should also purchase for its stores as many of the Indian made articles as possible.

ORAL EVIDENCE, 13TH FEBRUARY 1917.

Mr. C. E. Low.—*Q.* I understand that when you applied for a technical scholarship from Government you had some hopes of friends of yours in Berar starting a soap factory. That point does not arise in the course of your evidence but out of my personal knowledge of the case. That is the case, is it not?—*A.* It is. Owing to the war they were diffident of starting the venture.

Q. You met and asked several people but they did not come forward?—*A.* I saw them but owing to the war they were rather diffident of it.

Q. Simply owing to the war?—*A.* Yes.

Q. It was not due to the failure of the Akola cotton seed oil mill?—*A.* That had nothing to do with this.

Q. The Berar oil works were cotton seed oil works and they were running their show without any technical control?—*A.* They had none practically.

Q. And you think that their mistakes were largely due to that?—*A.* There was some scope for the improvement of the quality of the oil. They refined it but did not deodorize and I thought that by deodorizing the quality will improve and it will sell better, for the Nowsari Mill of the Bombay Presidency are deodorizing it and they are selling much better. I think I was right when I suggested like that.

Q. Why do you say that Provincial technological institutes must have good workshops attached to them?—*A.* These workshops will serve good many purposes. I suggest that there should be a place for the scholars who return from foreign countries to do some practical demonstrative work on a small scale, so that they may be able to convince the public about the prospects of starting factories. That will be one of the objects of these works.

Q. Do you say that a small workshop started and attached to technological institutions will be able to convince people about the soundness of ventures from a business point of view?—*A.* I may mention as a practical example the manufacture of soap that I have tried. That is quite a small concern and still it requires a place for being done. This small demonstrative work may not actually prove a concern to be a commercial success but it does go a great way to convince the people about the soundness of it, if undertaken on a sufficiently large scale.

Sir F. H. Stewart.—*Q.* Is that on a commercial scale?—*A.* A ton per month. That does not require any very elaborate arrangement and still it has been just sufficient to convince the people.

Q. Everybody knows that soap can be made in India. The point is how to make it pay?—*A.* That is what can be deduced from the prices of the articles and the quality turned out.

Q. Is there any other reason then for having a workshop attached to a technological institute?—*A.* The technological institutes will give instruction which cannot be complete unless there is workshop training for the students.

Q. You mean simply as part of the instruction and not as a substitute for factory training?—*A*. It cannot be a substitute for factory training, though it will make technological instruction more complete and useful than it will be without it. It will serve a double purpose. I have in view the Leeds University where in the tanning department for example they have got a workshop where the students are able to tan from 10 to 12 hides at a time and that is fairly good training for a technological institute.

Q. But in tanning they do not tan in such a way as to make the concern pay?—*A*. Quite so.

Q. And that makes all the difference?—*A*. It cannot be expected to turn the workshop demonstrative work into a regular factory proposition. The workshop however is quite essential and useful in other ways. It will serve double purpose. It will give the students training, at the same time to the scholars who return from foreign countries it will offer a convenient place to work on a small scale and be able to demonstrate.

Q. What is your position regarding the Indian Institute of Science? Are you in the employ of the Mysore Government?—*A*. Yes.

Q. They have sent you to the institute by arrangement with the authorities there for the manufacture of soap?—*A*. Yes.

Q. You say that the Government scholars who are sent home with technical scholarships acquire scientific training only and not practical training. And your remedy for that is that they should be given a further extension of their scholarship or paid again by Government after they come out here?—*A*. I plead that they should enter into factories in England instead of being sent into an University at all.

Q. That part is quite clear. But you say "The best way of doing this will be to keep these scholars for one year more in the pay of the Government and during this period they should be allowed to show on a small scale as to what they can do." That means an extension of their scholarship after their return to India?—*A*. Yes.

Q. During this time they should be made to show in what practical shape they can put their knowledge?—*A*. Yes.

Q. And you suggest that the pay of these foreign returned scholars should be Rs. 300-20-500 and that each one of them before training should be bound to serve the Government in case his services are needed?—*A*. In case the Government require experts for advising private concerns or to run pioneer factories, of course they should be taken.

Q. You mean that Government should then keep them on and should find employment for them and these are roughly the terms which you suggest?—*A*. It is not necessary that all should be employed. In case any work is to be done through Government agency such as experts to advise private firms or superintendents to run pioneer factories then they should be taken in on these terms.

Q. After they have proved their value as practical men?—*A*. Yes, but their previous training should be taken into consideration as well.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. Are you making researches in the manufacture of soap now?—*A*. I am working under the Mysore Government who intend to start a soap factory.

Q. You want that the scholars who come out must take up Government service?—*A*. Only in case Government wants them. It is not absolutely necessary that they must do so. What I mean is that a good deal of industrial work will have to be done by Government through the Department of Industries.

Q. You mean that Government should start the industry in each case?—*A*. Not exactly.

Q. Suppose there is a technical scholar who comes out, should Government start a textile industry for him?—*A*. What I mean is this. In certain provinces, in the United Provinces for example, they have got a technological chemist who has been appointed by the Government to help certain textile industries, in the Madras Presidency they have appointed a Leather expert to help the tanning industry, there is a dyeing expert to help the dyeing industries in such cases they should recruit from amongst their scholars.

Q. Don't you think that for such kind of work you want a higher type of expert than a student who has just come from England?—*A*. If the students are properly trained they will be quite sufficient to do the work.

Q. Do you think that with a study of two or three years, he will be able to materially help the industries?—*A*. If the training is properly done he will be in a position to help industries.

Q. Within three years?—*A*. Yes.

Q. You think he can stand before a man of 15 or 20 years' experience?—*A*. I doubt whether they have got persons in European countries who have got that experience.

Q. You say that England returned scholars should receive a salary of Rs. 300-20-500. But Government pay their experts much more?—*A*. That is quite a different question. I for the present look to the efficiency and my idea is that those who have really specialised in different branches seldom like to come out here. They become works managers there.

Q. You speak here about the difficulties of the students in England, the Indian students who go there to study. You say that they do not get proper facilities to learn the industries there. What is the remedy that you suggest?—*A.* I suggest that they should get admittance into factories.

Q. Supposing they are not admitted?—*A.* I think the India Office should arrange for it.

Q. Do you think that the India Office should force them to take these men into their factories?—*A.* They need not actually force them. I think the thing could be arranged if they like.

Q. That is the only remedy that you can suggest?—*A.* The thing is that business firms which have got no business connection with India do not object to taking Indians. If certain orders are placed with them by the India Office they will only be too glad to take them.

Sir F. H. Stewart.—*Q.* Do they also pay fees when they want them to work?—*A.* They are not paid any fees. They are only students and not workers.

WITNESS No. 272.

MR. N. S. TIRUVENKATACHARI, M.A., *Superintendent, Mysore Tannery (Limited), Bangalore City, and Managing Agent, Berhampur Leather Manufacturing Company (Limited).*

WRITTEN EVIDENCE.

Capital.

I have had experience of raising capital for the Mysore Tannery, Limited, Bangalore and the Berhampur Leather Manufacturing Co., Limited, Berhampur (Bengal). In the case of the first concern, just before starting, the then required capital of a lakh of rupees was practically raised by my friends in Bangalore and it was only when capital was wanted for expansion that I had to do the work of raising the same myself. I found the task very hard. Well-to-do people used generally to point to their experiences in previous cases where money invested in industrial undertakings promoted by Indians was lost. This was the excuse I invariably met with, whenever I appealed to the well-to-do classes. These classes were generally lawyers, big landlords and high paid Government servants. These people had no experience of business and had no knowledge of it. In South India, at any rate, they could easily get remunerative and secure outlets for their savings in loans on immovable property which bring them fairly high rates of interest. People engaged in business (those cases where they have superfluity of money) are not so nervous about industrial undertakings, but in South India, they don't think much of joint stock enterprises. A sound business proposition has now, I believe, a fair chance of being taken in as a proprietary concern by one or two merchants joining together provided the entrepreneur is ready to surrender everything to the mere capitalist and sink into a relatively subordinate position. But big undertakings have little or no chance of being financed this way.

In Bengal my experience has been chiefly confined to the raising of supplemental capital for the Berhampur Leather Manufacturing Company. I had about me three methods of working this concern—one involving a fairly large amount of extra capital—another a moderate amount and the third a comparatively limited amount. I was able to raise only the last amount, mostly from my friends who had confidence in me. From the general public at large, I had very little response.

My opinion is that as long as the rate of interest which capitalists can secure on advances against immovable property is so high comparatively, it is hopeless to expect any large diversion of capital towards industrial undertakings. The class of investors who have their money in the Presidency Banks on relatively low rates of interest, cannot be made to look with favour on fresh industrial undertakings however sound these may be, since the element of security which these investors value most is absent in the shares of a company. I cannot speak about Bombay, where I hear conditions are different. But even in Bombay only certain class of industrial concerns attract money, such as cotton mills, banks, etc.

Therefore, apart from active Government intervention, most hopeful results in the way of directing the flow of capital towards industries can be secured only from organised and well-directed attempts towards reducing the high level of interest now prevailing in the country. I know that the idea of what has been called "industrial banks" has secured a large measure of influential support, but I am sorry I have got to join issue with those who favour this scheme. In my opinion, the starting of State-aided banks, in addition to those that already exist, is nothing but waste of energy and unnecessary diluting of the already limited funds at the disposal of Government. The functions that I see ascribed to the industrial banks, can be, and in fact, are being [illegible] by the Presidency Banks who, as far as my experience goes, are [illegible] and advance any business proposition placed before them.

What I should like to see instead, is the placing by Government of all their reserve holdings in England, or elsewhere at the disposal of the Presidency Banks in this country. This would mean larger funds for the banks to operate with and they will automatically be compelled to lower their average rate of interest for loans; and since interest rates with other financial houses are always regulated by the rates obtaining in the Presidency Banks, the tendency will be for a generally lower level of interest throughout the country.

Government assistance.

Now, coming to active Government assistance, we have got the seven methods referred to in detail, under question No. 5. Of these the first form of assistance, namely, mere lump grants of money is not of much value, since it is hard to devise means by which a continuously healthy influence can be exercised on the concern after the grant is made.

Bounties and subsidies may be a very useful and efficacious means of stimulating exports of manufactured products and in one case, connected with my own industry, I should say, it is absolutely essential. I have in mind the case of glace-kids manufactured by the chrome process. India possesses the finest raw material in the whole world and yet the whole of this goes out as mere raw material instead of as finished leather as it ought to. There are not any technical difficulties in the actual process of manufacturing this leather, but the factories ought to be designed on a large scale and considerable initial loss is inevitable before labour can be trained to the requisite standard of skill and efficiency. Further, the markets are chiefly foreign countries which are purchasing the raw product here and their home trade is protected for them by tariff. There ought therefore to be here a system of subsidy (coupled with a lump grant at the start) so designed as to minimise the effect of this tariff wall and to help on the industry till it learns to classify its products and vary the quality so as to suit the exigencies of the foreign market. In this connection, I desire to draw the attention of the Commission to a letter appearing recently in the "Leather World" of London under the signature of Messrs. George Wichelow & Co. (Appendix I). I, for one, will welcome gladly any action which the Government of India or the Imperial Government might take with a view to making Indian raw products more easily available to the manufacturers in the United Kingdom; but unless such action is accompanied by even more vigorous and well directed efforts to promote the manufacture of finished products from such raw material in this country itself, it will be no good and Government action will leave us only all the poorer, inasmuch as there will be an artificial restriction of the markets for our raw produce, without any corresponding benefit to us.

Guaranteeing dividends: This will be quite useful for raising capital from the public provided proper care is taken and schemes are carefully scrutinized before Government starts helping concerns in this way.

Loans with or without interest: This will be all right, if the loans are on the security of buildings or plant. The stocks must be left intact and absolutely unencumbered, to enable the concern to negotiate floating debt with banks.

Machinery and plant on the hire purchase system: This also will be a great help in case Government provide proper safeguards for efficient, honest and economical purchase of the plant and machines. Whatever may be the efficiency of a buying department of Government, it goes without saying that a private individual or corporation is, as a matter of fact, able to buy its requirements more economically than Government where there is nobody with a direct personal interest in the matter of these purchases; and unless these transactions are done carefully what ought to be a help and boon might in the end prove to be ruinous and costly.

I have not got much experience of Government purchase of products; but from what I have heard, I think the value of this is very doubtful. If a stuff is good and is able to stand on its own legs and if Government require it, they are sure to go in for it as a matter of necessity; but if they go elsewhere and buy the article, they generally do so on the ground that the quality is not good enough for them, and the task of convincing an unwilling buyer about the quality of the goods he rejects is so superhuman, that the energy can be better diverted elsewhere. Personally, I do not much believe in Government purchases, not because the principle in itself is bad, but of the hardships which I know the enjoyment of such a privilege has given rise to in practice.

The sixth method of Government assistance, viz., the partial provision of share capital, is one which I have some practical experience of. The Mysore Tannery, Limited which is under my immediate control, is a Government-aided concern,—His Highness' Government of Mysore having shares in it, to the value of sixty thousand rupees, or nearly, one third of the total capital. The conditions under which the Mysore Government have taken shares are two, viz., (1) that two directors nominated by the Mysore Government must be on the Board of Directors of the Mysore Tannery Limited, (2) that an auditor nominated by the Mysore Government should be associated with the Company's auditors in the auditing of the Company's accounts.

These two conditions have been working for the last three years and except in one solitary case where the Government Director happened to be a gentleman of extraordinary business capacity, I can say that the benefit to the concern or to the Government from the presence of these Directors on the Board has been nil and the auditor has been doing more harm than good exaggerating trivial errors in form (errors incidental to all human beings). Quite recently the Government of Mysore has appointed a man trained under a Chartered Accountant to audit the accounts of the companies in which Government have an interest but even this arrangement (though far in advance of their original one) is not ideal, since the meticulous control of the Accountant General and his rules come in and freeze out any common sense method of conducting an audit. This result has happened because Government, I believe, had no systematic plan in conformity to which they could exercise their share of control in these aided concerns; and further, the tendency has been to regard these concerns, more or less, as so many departments of State subject to the rules and red-tape limitations which we usually associate with these.

Pioneer factories: I have a very good experience of a pioneer factory, having been in immediate charge of one myself, viz., the Madras Government Chrome Tannery at School of Arts and later on at Sembiam. For stimulating industrial progress I do not think any form of direct or indirect assistance by State is even a distant second to the starting of these pioneer factories. The idea must be to train young Indians as managers of business and captains of industry and a better training ground can hardly be found. Two such pioneer factories were started by the Madras Government on the initiative of Mr. Chatterton and both the industries so pioneered are now firmly planted in India and, in the case of the one I am connected with, I am of opinion that the change introduced in India is so important that it is likely to have far-reaching influences on the course of the leather trade in the whole world.

Speaking from personal experience, I can say that no amount of technical training in India or foreign countries could have helped us half as much as the training we had in this pioneer factory. I have had, while in this factory, and later on in the course of my own business, ample opportunities of comparing those of us who have had such training with European experts and Europe-returned Indians, and in almost every case, the technical knowledge and business experience of the latter was nowhere when compared to that of those trained in the pioneer factories. The whole of this portion of the subject is rather delicate ground for me to tread on, on account of the fact that I am one of the products of such a pioneer factory; but I feel I will not be doing my duty properly, if I do not place my views honestly before the Commission. I do not believe that any other form of Government assistance can produce results so enduring and beneficial as a pioneer factory—the only proviso being that a young Indian engineer or a science man must be in immediate charge of the factory, charge, that is to say, both of its business and manufacturing side, subject to the general financial control of the Director of Industries. I will not on any account employ European experts in these factories. Where it is necessary to consult them, this can be done by paying them a big or small fee, with special reference to the difficulty in question. In my own case, I have found these experts' opinion absolutely valueless; for they have their difficulties exactly where we have ours and Indian conditions are such that all difficulties here have to be worked out and solved here alone.

All industries for which India has natural facilities and into which the private capitalist has not ventured with success or with prospect of success should be pioneered by Government. The limit to such pioneering must only be a question of finance, though liberal provision ought to be made by Government. If Government gives no other form of help to industrial enterprise, in my opinion, this one policy of pioneering, subject to the condition I have set forth, will outweigh everything else, and within a decade or two there will be sound, quick and prosperous growth of industrial concerns throughout the country.

Such pioneer factories must be run till they earn decent profits and then they must be handed on to private companies floated for the purpose. Under no circumstances should Government convert a pioneer factory into a permanent Government enterprise—except perhaps in the solitary instance where the factory manufactures only such products as are used solely and exclusively by Government and where the dependence on a private concern will be against public policy. Also, in the manufacture of drugs—the purity and cheapness of which is of sufficient public and national importance—this exception must hold good; e.g., manufacture of quinine: but it is easy to carry this latter principle too far, and Government can never be too much on its guard against the temptation of converting a profitable pioneer concern into a permanent State enterprise.

Limits of Government assistance.

Regarding question 13, it is difficult, if not impossible, to formulate exact rules to prevent Government from aiding industries in those cases where such help will have a tendency to compete with existing enterprises. The one broad principle to be followed must be this: wherever there are factories which produce articles catering for certain specific areas, in those areas Government should not start either pioneer factories or aid rival factories. If public opinion is strong that such aid is necessary, it will be far simpler to assist the existing factory to expand rather than set up a rival concern. This rule must also hold good in those cases where, from raw material obtained in India an article is manufactured to meet the requirements of a foreign market. I have in mind a proposal made by one of the witnesses in Bengal before the Commission advocating the starting of a Government tannery in Calcutta to deal with the raw hides that are now exported from that place in large quantities and the trade control of which was absolutely in German hands up till the outbreak of the war. Such a tannery as that advocated will be quite out of place, since, not far from Calcutta there is the Berhampur Leather Manufacturing Company turning out excellent box-sides out of this raw material for the London market. If Government think their intervention is necessary they can't do better than try to enlarge this concern, though, in my opinion, it will be far better for Government to leave matters alone with simply an export duty on the raw hides or, if they so desire, a subsidy of so much per foot on leather exported to countries outside the United Kingdom. The manufacture of box-sides has come to stay and, I am confident, will soon assume big proportion. I myself have got in hand a scheme for starting a big chrome tannery in Calcutta after the war, which will, I hope, afford a satisfactory solution to the problem of dealing with these raw hides and of eliminating German influence from this market in Calcutta.

I am not able to understand question 14, but if it means that Government should not assist any enterprise which would compete with an established import trade of sufficiently large dimensions to have created what is called a "vested interest," I should say that there should be no such squeamishness; however big the import trade, the home manufacturer must receive all the weight of Government help and protection and the importer must be regarded more or less as a necessary nuisance to be got rid of at the earliest possible opportunity.

Technical aid.

I have little experience of Government experts assisting industrial enterprise with their researches. I have heard my friends engaged in mining and agriculture say they get good guidance and help from reports of Geological surveys and Agricultural bulletins ; though my own opinion is that these reports at least the few that I have gone through, do not concern themselves much with the economic or business side. My own opinion of Government expert advice is, that it is much too frigid and disinterested to be of any practical value. A professor in a Government college, with a comfortable income and no inducement or encouragement to private practice, has generally no incentive to undertake researches having an industrial value. Higher scientific education, at least in this country, must have a large dose of the industrial side to it and professors must be encouraged to take up private practice, charging fees for the work they do. If, for some reason, such levying of fees is considered undesirable, a professor's or an expert's work must be judged in accordance with the amount of help he has given to industries he can reasonably be expected to assist. There must be some such inducement, otherwise I am afraid Government expert advice will not have much practical value.

Demonstration factories.

I do not believe in demonstration factories where socalled improved methods can be demonstrated, necessarily on a small scale. Everybody engaged in practical manufacturing processes knows that there is a world of difference between demonstration experiments on a small scale, with materials used in pounds or ounces, and processes in a factory where the same class of materials has to be handled in tons; the pioneer factories can very well be used for these demonstration purposes, or where circumstances so warrant, an existing factory can be used for the purpose of showing to parties interested the value of these improved processes.

Research abroad.

No amount of research in foreign countries, under different conditions, will be of much use to India. Researches connected with Indian problems must be conducted in this country alone. And the best method of stimulating these researches is to get the very best scientific men to our colleges on very good pay and allow and encourage them to take up private work charging fees for such work. A professor, working like this, will necessarily have to employ his advanced students on the major portion of such research work with two advantages. First, Indian problems will be studied under Indian conditions; secondly, very soon, there will spring up a large volume of indigenous talent to cope with such industrial work.

Industrial surveys.

Just at present, we need not bother ourselves with such surveys. To those that are interested (and it is only these people who will read the survey reports), there is any amount of information buried in monographs and similar Government publications. An industrial survey just now will be a costly luxury which we can very well afford to be without at least for the present.

Assistance in marketing products.

I have seen a few exhibitions, but these are yet places of recreation rather than of business. Very few wholesale traders go to exhibitions with a view to transact business.

Exhibitions, organised on a grand scale, must be held in important places in India, say every three years, and attempts must be made to make these media for developing trade. The organisers of an exhibition send out prospectuses, circulars and notices and what not to all producers in the country and no effort is made to attract probable wholesale buyers of the products concerned. Exhibitors generally go away lighter in purse and a gold or silver medal is but a poor consolation for all the time and energy spent.

Trade representatives.

Trade representatives representing purely Indian interests must be appointed not only in Great Britain and the Colonies but also in all the important countries of the world. These trade representatives must be special business men and the nature of the business they are specially conversant with, must determine the country where they are to be appointed and vice versa. It must be their duty to collect all information likely to be of use to exporters or importers, and such information must be made available to parties through the medium of an official trade journal or otherwise. In addition to these trade Commissioners, special Commissioners may be appointed from time to time. I do not think that there is any necessity for provincial representatives in India itself. My views regarding Government patronage have already been set forth in a previous part of this paper and I have only to add that there won't be much harm done if Government departments are asked to publish lists of the articles they use and to exhibit samples in Government museums.

Banking facilities.

Such facilities already exist and, with the gradual opening of branches by Presidency Banks, are sure to increase by and by. If Government can release more of its funds for the use of these banks, the process is sure to be speeded up. Ample facilities, in my opinion, now exist for the discounting of short-dated bills on respectable parties, and quite a large volume of business is done in these. The discount rate is sometimes high, but, as I have already explained, this can never be remedied by a multiplication of State agencies. I do not say there is no room for more banks; for instance a bank for helping the small trader would be a very good thing, but these are fields for private enterprise and the recent history of Bombay banking cautions us to proceed at a steadier though slower pace.

All I want to make clear is that I am thoroughly opposed to any policy of Government which will result in diffusion of their funds. I want all the available spare money of Government concentrated in our Presidency Banks, as this is the only way, in my view, by which rates of interest can be reduced in this country.

Training of labour.

Primary education generally makes a labourer more efficient, and it is only after such education that better wages mean better living and more efficient work. I have had a night school working in the Mysore Tannery, Limited, for some time past in which the more grown up of my workmen get a sort of education. In some cases, after some time of this schooling, labourers have stopped drinking, are more regular in attendance, more efficient in work and otherwise generally better. An industrial school, as such, must be under the control of the Department of Education; for in the Department of Industries, more attention, I take it, will be diverted to the mere financial aspect of the institution with the result that instruction proper will be starved out; but at the same time the curricula for these schools must be drawn up by the Department of Industries and, if necessary, a system of inspection by the Department of Industries can be introduced and the action of the Director of Education may to some extent be guided by the reports of such inspecting officers.

Official organization.

To enable Government to take an active part in the promotion of industries in the country I advocate the appointment of an Imperial Director of Industries under whose control and supervision the Provincial Directors will have to work. Each Province will have its own Directors whose duty must be to formulate schemes for the development of particular industries by starting pioneer factories. The Provincial Director must be responsible for handing over these pioneer factories to private enterprise at the proper time. These schemes will be examined and criticized by the Imperial Director who may be authorized to consult any special experts if necessary and it is on his sanction that the pioneer factories must be started.

In State-aided concerns the Provincial Director will represent Government in the Directorate, if necessary, and he will guard and watch Government interests: but Government must have no right to demand from him reports as to proceeding of meetings and he must not be asked to divulge information connected with these companies which comes to his knowledge in the course of his duties.

I do not advocate the formation of a Board of Industries since no official can now afford to ignore public opinion, and at the earlier stages at any rate, it is necessary to have quick and energetic action which is impossible with a Board.

The Imperial Director must be a man of great organizing capacity with a fairly broad and comprehensive knowledge of industrial conditions in general, and, provided the proper Imperial head is obtained, I would leave the choice of Provincial Directors to him. An essential qualification must be their sympathetic attitude towards the people of this country, as on this, to a great extent, depends the success or failure of their work. I should certainly prefer a business man as a Director of Industries, though I must add, no successful man of business will care to accept the appointment and an unsuccessful man will do more harm than good. I therefore do not think it is possible to secure a good business man, and we are left to the choice between an expert and non-expert official. The only consideration that must guide us in the selection is the general industrial knowledge, organizing capacity and the ability to infuse confidence among Indians. Nothing else counts, though mechanical engineering and chemistry are great helps.

If Government start pioneer factories these must invariably be under the control of young Indian graduates in science or engineering whose appointments must be temporary. and who must be taught to look upon the enterprise as their future vocation in life. Expert assistance could be secured by occasional consultation.

After setting apart funds for the department, the Accountant-General must have nothing more to do with it. The Government can employ a Chartered Accountant of their own who will frame books for the Department and who will see that proper accounts are kept and money is spent in accordance with the wishes of the Government. No separate audit by the Accountant-General is necessary. The Chartered Accountant must work in close relation with the Imperial Director of Industries under whose control he may be placed.

The above only represent main ideas and details have to be altered or filled in according to circumstances.

Technical institutes.

There is a large body of influential opinion in this country which wants the immediate establishment of a large number of technological institutes in all the chief centres to enable young men to receive practical training in technical pursuits. But a little calm consideration will show that this is putting the cart before the horse. In the case of the industry I am connected with I know quite a large number of young men who have had training in some of the best institutes in London. These people have all passed out with honours and many of them are not now connected with the leather industry simply because they can't get employment. First, the factories must be created and then the necessity will arise for technically trained men. For the next ten years, every available rupee must be spent in pioneering industries and after this it will be time enough to start a technical college where young men, intending to be foremen assistants, and managers, can get proper training. But till such factories arise it will simply be waste of money for Government (and disappointment for the students) to start institutes with high-sounding names and pretensions where very little practical work can be done.

Colleges of Commerce.

Practical training in the art of conducting business rather than mere grounding in theory and economics should be the aim of these colleges. To ensure this result these colleges must secure selling agencies of firms and factories, divide their students in batches of any convenient number, say three or four and each agency must be in charge of one batch. One member of the batch will travel out for securing orders, another will look to the accounts of the agency, and a third will have charge of all the correspondence work connected with the particular business. In this way, in addition to the theoretical training the boys receive, they will also be practical business men when they come out of the college, with the result that they will have no difficulty in securing suitable appointments.

Suggestions for the development of the leather industry.—Compared with the production of raw hides and skins the internal consumption of leather in India is very little and all attempts to improve the leather industry which ignore this essential factor are foredoomed to failure.

At present the hides and skin industry of the country can be classified roughly as follows:—

(1) Export trade in raw dry hides mainly from Calcutta and Karachi. The majority of these hides, before the war, went to Hamburg though a fair quantity was shipped to America and the United Kingdom.

(2) Export trade in raw goat skins from Calcutta, Karachi, Madras and Bombay: This trade was mainly with America though other countries like France, Germany, Australia and the United Kingdom shared in it.

(3) Export of East India tanned hides from Madras and Bombay.

(4) Export of East India tanned sheep and goat skins from Madras and Bombay.

Hides and skins are after all by-products and their supply is strictly dependent on the demand for meat and beef. Hence the Indian hides and skins are a necessary factor to be reckoned with in the world markets and if India won't ship them in the raw state, her customers will have no choice, but to take them in the finished condition. If any foreign country were to discriminate against the products of Indian tanneries, by levying a high duty on them, a little bit of firm action on the part of the Government of India can easily rectify this and I don't see any real reason why there should not be a great and immediate progress towards modern tanneries and leather goods factories in India. The difficulties are chiefly those of organization besides the ones connected with training of labour and Government must step in at the initial stages with liberal help and guidance.

In the case of dry hides successful attempts have already been made towards converting these into finished leather and already India is exporting finished chrome leather to the extent of nearly a lac and half a month. The trade is fast developing and if Government wants to hasten the pace, they might well offer generous assistance in any of the ways mentioned under question 5 for any big tannery that might be started in Calcutta. Beyond this no other Government action is necessary.

With reference to raw goat skins I would advocate the immediate starting of a well-equipped Government pioneer factory about Calcutta for the manufacture of glace kids. The difficulties here are only those connected with training of labour. But it would only be a very modest estimate if I were to put down at four lakhs of rupees the probable loss that would arise to any concern from this source: with such a loss immediately ahead no private company can be expected to venture on the field.

Recently, I believe, the Government of India and the Home Government have been approached by interested parties with proposals to induce tanners in Madras and Bombay to increase their output of tanned hides for export to the United Kingdom. These leathers are now being used largely for military purposes, but in normal times it has often been the experience that an increase of supply simply spelled ruin to the Indian tanner on account of the glut and fall in price which such an increase caused in the London market.

I would therefore suggest immediate experiments to be started in the Madras Tanning School to retain and finish these leathers in the same way as they are done in England. With these finished products, such as waxed kips, semichrome bag and portmanteau leathers on hand, it would be quite possible not only to widen the present market in the United Kingdom but also to tap new markets in other countries.

Similar experiments ought to be undertaken in the case of skins also with a view to finishing these into Dongola, roans, and Skiver leathers.

Further, another pioneer factory in Calcutta or Bombay must immediately be started with a view to making picking-bands and lace-leathers, as also belting and roller leathers. At present the Indian consumption of these mill leathers is quite big enough to keep two or three large tanneries going and once the initial difficulties are removed, leathers of the same quality as that of those now imported, can be easily turned out, in fair quantities at much cheaper prices.

APPENDIX I.

GOVERNMENT AND GLAZED KID TRADE.

(*From the Leather World of the 14th December 1916.*)

DEAR SIR,

In your leading article of December 7th you suggest that the Government should give increased facilities for the importation of raw goat skins.

We English glace kid manufacturers have been endeavouring to obtain some assistance of this description from the Government for the past twelve months, but our efforts have been in vain, and we have now concluded that it is hopeless to try and get any department to give any encouragement to home manufacturers. The last reply we received on this subject from the Board of Trade speaks for itself. It was—

> "The imports of skins into this country are quite normal, although the exports are excessive. If America can pay these high prices, England can do so also. It is up to the English manufacturer to pay more than the American, and he can then secure the skins."

Apart from the official opinion expressed in this reply, the statements as to imports are very fallacious. The majority of raw skins figuring in our imports are only transhipped here. English manufacturers could not purchase these skins at all, as they are not for sale here. The only service they do to this country is to swell the misleading Board of Trade returns, by appearing first as imports, then as exports, and again when manufactured, plus cost of manufacture, freights and profits to the foreigner, as imports; thus a parcel of skins of the value of £10,000 would appear in our trade returns as, say, £35,000 out of which England has gained no benefit, in fact, has lost valuable shipping space.

Probably 75 per cent of the skins from which glace kids are made is the produce of the British Empire, and although the cost of upholding that Empire falls mainly upon us here in England, we can have no prior claim to obtain the raw materials produced in our Empire, and urgently wanted here in England for the clothing of our people.

We have not asked that anything should be done that would penalize the producer. We quite agree that he should obtain a fair market value for his goods, but we do ask that the control of the raw hide and skin trade should be taken out of the hands of the German dealers, who now, even, as before the war, control the collection and distribution throughout the world. On this point I last week attended at an interview at the India Office. The view of the official with whom we had the interview was that their duty was to see that the native obtained the best price possible for his goods, irrespective of whom the buyer was. We pointed out that our belief was that the native did not obtain much of the increased price. It chiefly went to the dealers, who were Germans, or of German origin. The reply was that he was afraid it was so, but he could not see what could be done. It is evidently quite useless to expect anything to be done by the Government, and manufacturers here have now quite realized that they must depend entirely upon their own efforts, not only to obtain raw materials, but to overcome difficulties that are daily occurring, caused by official mismanagement.

On the same day that I received the Board of Trade's reply to the raw goat question, a circular letter was received saying that the Government were greatly concerned about the increased imports of glace kid, and asking what increase of output we could do, providing labour was found.

The present position is such that within a very short time the English glace kid manufacturer will have to consider the curtailment of output—not the increase.

At the present time, skins are almost unobtainable, prices are at heights previously never dreamt of, and yet the supply of skins in our possession is normal. France is more careful to maintain her manufacturers. All French Colonial skins, of which there are large quantities, are entirely reserved for French factories.

Boot manufacturers may be interested to know that the price of glace kid today, high as it is, does not represent the cost, based upon today's price of raw skins. The cost of leather finished from skins purchased today will be considerably above the selling price of glace kid. I have before me a quotation for Szechuan (China) goats, which will cost 3 shillings per foot in the hair. Amritsar skins, normal price 24*d* per skin are quoted 83*d* today. It must also be remembered that skins purchased now are not received until three to four months afterwards, so that goods purchased now are not available for sale as leather until about six months hence. Even when purchases have been made, difficulties are found in obtaining freights, *preference being given to cargo for transhipment to America*. The following is an extract from a letter I received recently from a skin merchant:—

> "S.S. *Umaria* called in yesterday at this port (Madras). We had 25 bales ready against your . . . . order, but the steamship agents said today that they will allow only thirty bales for us for shipment to *American ports*, owing to the limited space available in the steamer for cargo other than Government one. Further they are allowing only American cargo, and not London or Marseilles."

Surely we English manufacturers should be entitled as a right to have first claim on any available shipping space for goods urgently required in England, produced in our Empire, and carried in ships under the British flag. And yet the shipping company is allowed to decline to carry goods for use in England, but offer to carry the same goods to England, conditional upon them being transhipped to America.

Every discouragement has been given to English leather manufacturers to produce leather here, and the surprise is that the quantity produced is as large as it is.

Yours faithfully,

A. P. PRESTON,
Managing Director, George Wichelow, Limited.

BERMONDSEY,
11*th December* 1916.

ORAL EVIDENCE, 14TH FEBRUARY 1917.

Mr. C. E. Low.—*Q.* Where did you obtain experience of this process from?—*A.* From the School of Arts, Madras.

Q. What educational qualifications have you?—*A.* I have taken the M.A. Degree in the Madras University.

Q. Did you go straight from there?—*A.* I was in the Law College when the School of Arts was started. I applied for a place and ever since have been connected with this industry.

Q. You were connected with chrome tanning experiments from the beginning?—*A.* Yes.

Q. Were you with the chrome tanning experiments until they were closed down?—*A.* I left the place just a year before it was closed and came down to Mysore and started this company.

Q. Up to the time you were with the experimental chrome tannery in Madras, had technical success been gained in the process?—*A.* Considerable technical success had been gained. We were manufacturing mainly there the coarser kind of leather.

Q. But you were still losing money on the experiments?—*A.* We had arrived at a stage when we were beginning to make profits.

Q. What year was that?—*A.* About April 1909 the company was started. We only began working here in October 1909.

Q. When you left the experimental chrome tannery where did you go then?—*A.* I started this Mysore Tannery here.

Q. Could you make profit on the leather or on the manufactured article?—*A.* On the leather. On the manufactured article my experience has been a losing one.

Q. Where did you get your capital from?—*A.* From my friends in Bangalore.

Q. You raised, you say, a capital of a lakh?—*A.* Yes.

Q. You afterwards had to raise more money?—*A.* Yes, and then I found it very difficult.

Q. Was the further money required for capital extension or for working capital?—*A.* Partly for working capital but mostly for extensions.

Q. Did you ask for any assistance from any bank for working capital?—*A.* Yes, from the Bank of Madras, and they gave me assistance readily enough.

Q. On what security?—*A.* On the security of my stock-in-trade.

Q. Did you get anybody's recommendation as to the soundness of your concern?—*A.* No, I went and saw the Bank Manager straight, Sir W. B. Hunter. I explained to him my position, took him to the tannery, and all that I can say is that I did not find any difficulty in getting the assistance from him.

Q. Did he require you to hypothecate your stock?—*A.* Yes.

Q. Was any other security required?—*A.* No.

Q. You did not get two names?—*A.* No.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* You must have given possession of the goods?—*A.* The goods are in my possession, but they were supposed to be in the bank's possession.

Q. Then it is the goods and the signature, that would be two securities?—*A.* There is no signature at all. There is the mortgage deed the mortgage effected by two Directors of the Tannery. The Directors had nothing to do in their personal capacity. The bank can advance money under the Presidency Act on goods. The Bank Act allows it. I am sorry I have not brought the Act. That Act clearly allows it.

That is not my experience.

Hon'ble Sir R N Mookerjee.—*Q.* This gentleman (pointing to Hon'ble Sir Fazulbhoy) is Chairman of a Presidency Bank?—*A.* In the Act it is said "against goods" but the goods need not be in the possession of the bank. Two other signatures are not necessary. The bank can advance money on goods under the Act, provided the goods are marketable.

Q. When you got the money was the value of the goods more than the loan?—*A.* The goods were more than the amount of the loan.

Mr. C. E. Low.—*Q.* Is this arrangement still going on?—*A.* Yes. Every month I send a list of the stock I have. As manager I am not responsible for the loan.

Mr. A. Chatterton.—*Q.* You have an overdraft with the Bank of Madras?—*A.* Yes.

Q. Up till some time last year the limit was fixed at one lakh and fifty thousand rupees?—*A.* Yes.

Q. Last July I think, or June, owing to various reasons it was desirable to increase the overdraft and after certain negotiations with the bank, the overdraft has been increased to 2½ lakhs. Before the new mortgage deed was signed a statement of the stock-in-trade of the whole tannery was submitted to the bank, and that was valued at considerably more than 2½ lakhs, that is to say there was considerable cover?—*A.* There was any amount of cover; a margin of one lakh.

Q. And you have now a cash credit to the extent of 2½ lakhs, and that is sufficient to enable you to carry on your business smoothly?—*A.* Yes.

Q. Recently there was some difficulty about negotiating your bills, and the bank has given you further accommodation?—*A.* They have agreed to give me further advance on the security of my goods.

Q. What security are you tendering for this additional amount?—*A.* I have got orders for the goods I am manufacturing. The only difficulty is that I cannot get freights. I have manufactured Rs. 80,000 worth of leather. If I go on like that, till such time as we get freight, the bank is prepared to advance us further money to purchase raw materials.

Q. Then at the present time you are getting every possible assistance?—*A.* I have no reason to grumble at the assistance.

Hon'ble Sir R. N. Mookerjee.—*Q.* Who introduced you to the bank?—*A.* The Honorary Secretary of the Tannery, Mr. C. S. Doraiswami Ayyar, who knows the bank.

Q. Did your relations with the bank begin before or after the Mysore Government took [illegible] in the tannery?—*A.* Just a little before.

Q. You were making arrangements with the bank before?—*A.* Yes.

Q. Do you think that the presence of the Mysore Government as participant in the [illegible] facilitated your relations with the bank or not?—*A.* I cannot exactly say. At the time I had entered into negotiations with the bank, the bank knew that the Mysore Government was about to assist me, but whether that had any influence with them [illegible] you

Q. At any rate it was not insisted upon by the bank as a condition?—*A*. Certainly not.

Q. At the present time you are manufacturing some eighty thousand rupees of finished leather per month?—*A*. Yes.

Q. Are you trading at a profit?—*A*. Yes.

Q. And you have been doing so for some time?—*A*. Yes.

Q. Do you sell much of your leather in India, or mostly outside India?—*A*. At one time, I used to, but now I sell all outside India.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. To whom are you selling—to Government?—*A*. Yes, and to private parties also.

Mr. C. E. Low.—*Q*. What class of leather?—*A*. I am doing only one class of leather, black boxside.

Q. Those are for boot uppers mostly?—*A*. Yes, they are all for boot uppers.

Q. What classes of hides do you tan ; what is usually known as "Bangalores"?—*A*. I am buying hides practically all over India.

Q. Are you purchasing hides in Calcutta?—*A*. Yes.

Q. Do you find any opposition from these export houses of German inclinations?—*A*. The market is not a free market now because there are a lot of restrictions on these hides, but if the market were free it would be very difficult to purchase against them.

Q. For what reason do they pay more than a hide is worth—to keep you out?—*A*. No, but they have their factories on such an enormous scale that their working expenses are very low and it would pay them to buy at slightly higher prices than we.

Q. They are only exporters?—*A*. Yes, but eventually these hides go into the hands of the tanners at home.

Q. But the tanners are a very different interest to these exporters in India, very often a hostile interest. The tanners in Germany, before the war, were bound to purchase through the Hamburg or Bremen exporters, and the exporter in Calcutta was bound to sell to them?—*A*. One year before the war they made a *bandobast* like that.

Q. With reference to people who bought for consumption for manufacturing in this country, did they also oppose that too?—*A*. People who manufacture in this country do not go in for dry hides. Dry hides are necessary because they have to stand the voyage between this country and Europe.

Q. How long will wetsalted hides keep?—*A*. They will keep quite sound for a month or a month and a half.

Q. Do you keep stocks for any length of time?—*A*. It is not necessary to hold large stocks of raw hides for a long time.

Q. What is your capacity in hides?—*A*. About 250 hides a day.

Q. The Mysore Government took shares in the tannery?—*A*. Yes, for about sixty thousand rupees, nearly one-third of my capital, the capital being one lakh and seventy four thousand roughly.

Q. For what reason did the Mysore Government take shares? Was it at your request or their suggestion?—*A*. At our request. In connection with this tannery we had to go through a lot of vicissitudes. We had a boot factory attached, which was losing money, and in trying to expand this business I had to go to Government for assistance.

Q. To what do you attribute the fact that the boot factory was run at a loss?—*A*. I am in a very unsuitable place for a boot factory. The market is in Northern India, and there is practically no labour here. I had to train every bit of labour required for my boot factory, and the high freight between this place and the market contributed towards killing the industry.

Q. Do you think it is a desirable form of assistance, Government taking a share in the capital?—*A*. Yes.

Q. Which do you think will be most helpful to you, for the Mysore Government to have guaranteed some dividend, say 5 or 6 per cent or to put down this money?—*A*. Probably if the dividend had been guaranteed, it would have been easier to raise money from the public, but I have no practical experience of it. I cannot speak with much authority.

Q. Do the Mysore Government have Directors?—*A*. Yes, they have two Directors.

Q. What action do their Directors take to safeguard the interests of their principals?—*A*. That is the whole point. Some of the Directors that the Mysore Government appointed, when important questions came up were afraid to take the responsibility on their shoulders. They always said they had to refer to the Government ; therefore I say, when Government take shares and appoint Directors, these must be given a free hand, otherwise no business could possibly go on, and business cannot wait because these Directors have to refer to Government.

Q. Do you think the control of the policy, interfering with the policy of a concern from inside, is necessary, or is it sufficient for Government to know what is being done in the business in the matter of accounts securing proper audit?—*A*. In the case of a concern like mine, I would certainly leave them with the two Directors they have and to that extent they can influence the policy of the company. They are in the same boat as the other directors.

Q. If there are two directors out of six, say, they must refer things to Government. The other directors can outvote them surely?—*A*. Yes, it is only a theoretical consideration, as Government are so powerful that people think twenty times before they run counter to the wishes of Government. We like to carry them with us if we possibly can.

Q. You say, " Quite recently the Government of Mysore has appointed a man trained under a Chartered Accountant to audit the accounts of the companies in which Government have an interest, but even this arrangement (though far in advance of their original one) is not ideal, since the meticulous control of the Accountant-General and his rules come in and freeze out any common sense method of conducting an audit." I suppose the Government rules are much the same as the Civil Account Code in British India?—*A*. These Civil Account Codes in force in Government offices are not suitable for conducting audits of commercial concerns.

Q. If Government wish to audit commercial accounts it should be done purely by Chartered Accountants?—*A*. Yes, and not by any man connected with a Government office.

Q. Do you think that such audit would command the confidence of the commercial public?—*A*. Considering that crores of rupees are invested in commercial concerns which are audited by Chartered Accountants only, I should think that an audit by Chartered Accountants should command confidence.

Q. You say that you would not on any account employ European experts for these pioneer factories, where it is necessary to consult them. You say your reason is that the European expert's difficulties are precisely yours, and because you can get experience in other countries which will bring you up to the same standard. Have you ever had a European expert out here with ten or fifteen years experience in box sides? —*A*. I cannot say about their previous experience, but I know a lot of Europeans in the leather manufacture who have come out here and are doing box sides for private people, and presumably the people who selected them knew all about their antecedents because they got them out especially for this purpose.

Q. You think that the best form of training to enable Indian industries to stand on their own legs is the pioneer factory?—*A*. Yes, I strongly think so.

Q. The experience of pioneer factories is that they take a good long time and make a certain number of mistakes before they attain their end, although I don't undervalue the mistakes, as they have their uses?—*A*. But you cannot have the millenium in a day.

Q. Could not the process be shortened a bit, if you can get hold of a decent expert from any other country where they knew these things?—*A*. If you can point to any case where an expert has come out here and started an industry quickly.

Q. What about the Tata steel industry?—*A*. I don't know much about it, but they have taken a pretty long time.

Sir D. J. Tata.—*Q*. What do you mean by a " long time."?—*A*. About ten years.

Q. Four or five years were only construction years, and after that the thing began to pay?—*A*. You were employing the same experts all the time? You did not change experts for other experts?

Q. Our Consulting Engineer has been the same right through. I think for establishing a new industry, the presence of the superior expert is absolutely necessary?—*A*. You can have a Consulting Expert in some foreign country, but my contention is that the factory you start must be under Indian control, as we can only learn from our own mistakes, and that is the only solid foundation.

Mr. C. E. Low.—*Q*. But you would not propose to start a thing like a big steel works on those lines?—*A*. You mean establishing pure steel works? Certainly not.

Q. Then you would subject it to some practical financial limit within which Government would be justified in spending money and making mistakes?—*A*. But I would do all the preliminary work for starting a steel factory on a large scale.

Sir D. J. Tata.—*Q*. The iron industry was done by experts who come out from Europe and it is only now we are beginning to do without their assistance. In all the Cotton mills you have to have the European from Lancashire to supervise the operations?—*A*. I don't think it is necessary to do so. If it is, it does not reflect much credit on the way that the Bombay cotton mills are conducted. My contention is that if you wish to train Indians to be captains of industry, you can do it much better by starting factories rather than by importing experts. It has taken a long time for you to train Indians in the cotton factories. You can consult experts, but I would not put an expert in charge.

Mr. C. E. Low.—*Q.* You are not in favour of a provincial Board of Industries?—*A.* Not at least to start with.

Q. Not even an Advisory Board?—*A.* Not to start with, that can come later on.

Q. You don't think an Advisory Board of Industries would be valuable when there is a question of looking at the business nature of a proposition put up to see whether it is a thing that Government should help or not?—*A.* My view is that the delay that is involved by an Advisory Board would more than counterbalance the advantage that the creation of such a Board would give us.

Q. You have seen something of the working of an Industrial Department under a Director of Industries. Is not the delay superimposed by the control of the local Government?—*A.* That delay is always unavoidable even if you have an Advisory Board.

Hon'ble Sir R. N. Mookerjee.—*Q.* Do you prefer an Indian to be Director of Industries, or a European here ; do you have any distinction as you have in the case of the expert?—*A.* I should certainly prefer an Indian, if you can get a proper man.

Q. Then if you cannot get an Indian you would have an European?—*A.* Yes, if you go in for an expert I would not set any limitation to his nationality.

Mr. C. E. Low.—*Q.* You say you " should certainly prefer a business man as a Director of Industries " and you take the position that it would be impossible to get a good business man and you are " left to the choice between an expert and a non-expert official ". What do you mean?—*A.* What I had in mind is this. I would say a non-expert is a Civilian, a man who had experience in administration work only.

Q. An official, but the question is as between an expert official and a non-expert official?—*A.* Yes. My only objection to the employment of a business man is that you cannot get him. If you can get him he is much better. If you can get a person with a large public spirit who would be willing to take up the position of Director of Industries for four or five years, that would be ideal.

Q. You say you " advocate the appointment of an Imperial Director of Industries under whose control and supervision the Provincial Directors will have to work." Where does the local Government come in, when you say " control and supervision "?—*A.* All that I want is that there must be no lopsidedness. The Director of one province may be dealing with problems already engaging the attention of another province.

Q. With reference to these State technical scholars, the difficulty is that they don't get practical experience in factories?—*A.* Yes.

Q. Have you seen anything of these State scholars?—*A.* I have seen a great many connected with my industry.

Q. What is your opinion about the defects of their training?—*A.* There is only one man who has had such training and is doing very well. All the rest are more or less failures.

Q. Do you think that if you could get factory training, plus a certain amount of technical training, it is worth while sending State technical scholars home?—*A.* I am afraid I am not able to make myself understood. Supposing you send students who go and get trained and come here, where is the scope for their employment?

Q. You mean that industries must precede technical training?—*A.* Yes.

Q. You have got a certain number of industries actually working, a certain amount of leather, a good deal of textile. Supposing Government say, " We want to build up a certain level of Indian experts in these things, how are we to set about it "?—*A.* They can do it very easily in this country.

Q. Do you think that the difficulty of getting factory training in Europe or America is a serious obstacle?—*A.* That does not count, at all. Supposing we wanted a textile expert in this country, there are any number of cotton factories in India.

Q. How could Government help men to get actual factory training in this country, along with the necessary theoretical training?—*A.* If there are factories from which Government are making any purchases, they can make it a condition of their purchases that there must be a training for a certain number of apprentices every year.

Q. Otherwise you think that people would be unwilling to admit students?—*A.* Generally. There are exceptions who are not so unwilling, but generally they are unwilling to let in probable competitors to come and learn the work.

Q. Supposing Government go on with the idea of these technical scholarships. Do you think they should insist upon a man going on with his training for another year, say, in India, in a factory?—*A.* I would put the training in India first, and then send him to foreign countries. Then he will at least know what to learn.

Q. That would practically mean also that no man would be given a State technical scholarship until he had a certain amount of experience because no man can go into a factory without some experience?—*A.* I would go further and say that the man must be made to learn all that it is possible to learn in India and then be sent to foreign countries.

Q. Do you think labour for tanneries is more easy to come by in the South of India than around Calcutta?—*A.* There is very little to choose between the two places. In every place you have to train the labour.

Q. You have a low caste population in Southern India who readily take up a lot of the tanning operations?—*A.* Now machinery for tanning has been provided to such a stage that almost every operation can be done by machinery.

Q. You want a lot of coolie labour for handling and washing the hides?—*A.* Yes, that you can get around Calcutta quite easily.

Sir D. J. Tata.—*Q.* We learned in some places that even in tanneries Brahmins are ready to go and work, is that your experience too?—*A.* Yes, I have no trouble about labour. I am a Brahmin myself and have plenty of Brahmins under me. In my boot factory every man who was working a machine was a Brahmin. They will do any amount of dirty work.

Mr. A. Chatterton.—*Q.* You have had experience of the hide and leather trade in Calcutta?—*A.* Yes, I have fairly good experience.

Q. You belong to a firm of which you are Managing Director in Calcutta?—*A.* Yes.

Q. And your firm is managing agent for the Berhampur tannery?—*A.* Yes.

Q. Is that tannery run on the same lines as the Mysore tannery?—*A.* Yes.

Q. And it is gradually developing?—*A.* Yes, only that it has not the disadvantage that the Mysore Tannery was labouring under at the start.

Q. So that you have got considerable knowledge of what is going on in Bengal and the North-Western Provinces in regard to the leather trade?—*A.* Yes.

Q. Do you think it is practicable to start a tannery in Bengal or elsewhere to deal with practically the whole of the output of dry hides and wet-salted hides that are now exported in raw condition?—*A.* It is quite practicable, provided the capital is forthcoming. There we would have the difficulty.

Q. Have you got any ideas on the subject of raising this capital?—*A.* To raise the capital just now by private means would be almost impossible, because for all the work we have done up to now we have no tangible results to show in the way of big profits. All that we have done is to run for the last seven years and have got our capital intact. Although we know that the thing is very profitable, we cannot convince people so that they may put money into it. It will take two or three years more.

Q. How much will it cost to train unskilled labour in Calcutta so as to make it fit to run a tannery on the same lines as you have here, supposing you have a tannery turning out a couple of thousand hides a day, what would it cost you to train that labour?—*A.* I would put it down at three or four lakhs of rupees in the way of spoiled leathers, as against a total capital of 20 lakhs.

Q. Supposing a company were floated and it got a certain annual grant from Government for the purpose of training its labour, do you think that would facilitate the raising of capital?—*A.* It ought to, but seeing that I am not a financier myself, how can I have an opinion on that?

Q. Possibly you have discussed that with people in Bengal?—*A.* Our people say that they will do so and so, but when the thing is done they generally hold back.

Q. Assuming that it is desirable that we should establish on a big scale a tanning trade in Bengal is it desirable for Government to start a pioneer factory? Supposing they did that, how would that affect the interests of people like yourself?—*A.* I would strongly protest against it, unless I had a good finger in that pie. My position is perfectly fair. We have spent all these seven years, have done a lot of work, undergone losses, before we built up a market in foreign countries in this class of leather, and now for Government to say they are going to pioneer the industry is not fair.

Q. Accepting that position, and also on the assumption that it is necessary to take immediate steps to develop the tanning industry, what would you require from Government to enable you to make rapid and large development in the business that you have already started?—*A.* Let them plank down the money for this pioneer factory and I will run it successfully for three or four years. I would guarantee to convert it into a "Limited" Company.

Q. What about the interests of the tanneries that are not directly connected with your tannery?—*A.* I will join them all with me.

Sir D. J. Tata.—*Q.* You want to create a Trust?—*A.* Yes.

Mr. C. E. Low.—*Q.* You would offer shares in the Company to all existing tanneries?—*A.* We will form ourselves into a sort of Association and work this concern. I am not in a hurry to start that tannery. I will allow things to go on, but in three or four years I will make people in Bengal realise that the leather industry is very important and profitable indeed. The concern I have started in Berhampur has such a bad name already that it will take three or four years to restore it to favour. I contend that it is unfair of Government to start public concerns and rob us of the fruits of our labours, because it comes to that and nothing else.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Have you got Bengalis training in that factory?—*A.* Yes.

Mr. C. E. Low.—*Q.* In Reuter's telegrams recently there was a proposal from some British manufacturers to start a tanning concern in Calcutta?—*A.* Let them start, but I don't want Government to go out of its way and start. If Government were to come and start, it will go very hard with all of us.

Mr. A. Chatterton.—*Q.* But in starting a tannery in Bengal only a certain portion of the material available in Bengal will be suitable for manufacturing chrome leather?—*A.* A good portion of it would.

Q. What would you do with the unsuitable raw material?—*A.* That would be made into bark tanned leather.

Q. Where do you get your supply of tanning materials from?—*A.* There are a lot of tanning materials in Bengal.

Q. Have you any experience in using Mangrove bark?—*A.* No.

Q. You anticipate there would be no technical difficulty in getting the materials on a sufficient scale to carry on bark tanning as well as chrome tanning?—*A.* No, there would be no difficulty at all.

Q. And similarly in regard to skins?—*A.* Yes. There would be less difficulty, but the only thing is that they ought to be on a less big scale financially.

Q. Assuming that we cannot wait until you have established the reputation of the Berhampur Tannery, so as to command capital freely for the development of the tanning industry ; and assuming that Government is willing to render assistance to you and to any other established concern in Bengal, you have suggested that you might form a Trust or combine of existing tanneries. Assume that that is not practicable, that the other people do not agree, can you suggest any form in which Government should offer assistance definitely, so that any existing tanneries may avail themselves of it provided they have the requisite technical skill?—*A.* Give them more money for working capital.

Q. Would you have it in the form of a loan, or a guarantee of Government interest on capital for a short time?—*A.* I would have it in the form of a loan.

Q. You want a loan to purchase plant?—*A.* Yes, block account.

Q. And your block account would belong to Government?—*A.* To the extent that they have advanced money on it.

Q. Supposing that Government are willing to put a considerable sum of money into this tanning business, would you consider it desirable that Government should render such assistance to a number of concerns if they applied for it, and if they were able to satisfy the requirements of Government in regard to their capacity for dealing with the matter?—*A.* I have no objection to Government helping any number of concerns, but it would be better if they concentrated their help on one concern in Calcutta.

Q. You think there would be no difficulty, no disadvantage in Government rendering assistance, say, to your concern, to the Bengal National Tannery, etc., assuming always that they satisfied the other requirements that would be laid down?—*A.* I would have no objection.

Q. If Government advanced a sufficient amount of money to provide for the establishment of these tanneries working on a large scale, how would you get the necessary working capital?—*A.* We would have to get a small portion ourselves and arrange for the balance with the banks.

Q. If Government were willing to do this: supposing Government was willing to give you five lakhs to develop your tannery in Calcutta ; would it be possible for you to raise any considerable sum of money yourself?—*A.* I could raise another one lakh or two lakhs.

Q. And you would be willing to let the Government hold a mortgage over the whole concern?—*A.* Over the building and plant, leaving my stocks.

Q. If Government were prepared to do this sort of thing, Government would have to exercise some sort of control or supervision over the working of the tannery. The question now is what kind of supervision would be effective both in the interests of the tannery itself and in the interests of Government, to see that the money they have advanced is not squandered or lost?—*A.* A searching audit by chartered accountants and Government would have a voice in the directorship.

Q. Would it be advisable that Government should have a competent expert in their employ to sit on the Board of Directors and watch the operations?—*A.* What do you mean by an expert? A director, not a business man, is all right, because there is no difficulty in the manufacture of leather at all.

Q. You spoke of labour in Calcutta which is a very important question. Is this labour of the same class as the *chucklas* in Madras?—*A.* Yes, of the same class. They belong to the chamar class in Calcutta. But in the case of a factory working with machinery, caste people would come in easily. All my machine workers are *bhadralogs.* I have 60 men, of whom 45 are *bhadralogs.*

Q. Recently, in Bangalore you started a small school for the training of workmen, and you put up a special building outside the existing tannery. What was the object of this? What sort of education is being given in this school?—*A.* A little bit of religious and primary education.

Q. What is the object of that?—*A.* That takes them away from drink and other vices.

Q. Have you got a guru in charge?—*A.* A man who has considerable influence over them.

Q. Who attends this school? Is it the Chucklers?—*A.* All my workmen,—those who are uneducated.

Q. Are you giving them a general education in reading, writing and arithmetic?—*A.* Yes.

Q. And you want to have this school under the supervision of the Education Department because it is dealing with general education?—*A.* Yes.

Q. You are not giving them any technical education in the school?—*A.* Not technical They get that in my factory.

Q. You are not giving them lectures in chemistry?—*A.* No.

Q. What proportion of the employees in the tannery attend this school?—*A.* The whole of my tannery staff except the Brahmins.

Dr. E. Hopkinson.—*Q.* In what year did the Mysore Tannery start?—*A.* In 1909.

Q. What is the capital?—*A.* One lakh and about 64 or 70 thousand.

Q. Of that capital the Mysore Government found one-third?—*A.* Yes.

Q. It is all in the form of ordinary shares?—*A.* Yes.

Q. You have paid no dividends as yet?—*A.* No, I paid 6 per cent in 1910, 3 per cent in 1911, 5 per cent in 1912, 5 per cent in 1913, 3 per cent in 1914, *nil* in 1915.

Q. What is the reason of the falling off in profits?—*A.* It is generally due to my boot factory which has been losing.

Q. When did you start the boot factory?—*A.* It was started along with the tannery at the same time.

Q. Why does the boot factory not pay?—*A.* I have explained that, I am far from the market.

Q. And you can now borrow from the bank on the security of stocks to the extent of 2½ lakhs?—*A.* Yes, and now even to the extent of 3½ lakhs.

Q. So that, roughly speaking, about three-quarters of your capital is provided by the bank?—*A.* Yes, but that capital is very floating, only when purchasing my hides. If I want to clear off the bank today I can do it by selling off my stock, and there is no difficulty in selling my stock.

Q. Are there any transactions in your shares?—*A.* No.

Q. Is it unusual for there to be any?—*A.* There are not many here ; generally we do not indulge in share transactions in the South of India, there being no recognised share market.

Q. With reference to Berhampur, when was that started?—*A.* I had something to do with Berhampur only from last year. It was started practically one year before the Mysore Tannery, 1908.

Hon'ble Sir R. N. Mookerjee.—*Q.* Not by you ?—*A.* No.

Dr. E. Hopkinson.—*Q.* What was the capital?—*A.* It was practically a proprietary concern belonging to the Maharaja of Cossimbazaar. The building had been built and some of the machinery had been imported. About Rs. 80,000 had been sunk in the business.

Q. And it now belongs to whom?—*A.* Now it is a "Limited" Company with a paid-up capital of one lakh and thirty thousand rupees.

Q. Did that capital of one lakh and thirty thousand represent the real value of the concern?—*A.* Yes, of the plant and machinery, less about ten or fifteen thousand for working capital. I have borrowed money also.

Q. The capital was not "watered" at all?—*A.* I don't understand, please explain. (On this word being explained to witness, witness replied) No, it was not.

Q. In that case had you any accommodation from the bank?—*A.* Not yet.

Q. But you require it possibly?—*A.* I will certainly require it.

Q. Is it paying a dividend now?—*A.* This year I made a very decent start. It cost me about ten thousand. Training labour, i.e., I dropped ten thousand up to the end of July, and by the end of December I had not only made up the ten thousand, but made an additional profit of ten thousand.

Q. Why do you say it cost you ten thousand?—*A.* The factory was not going. It was I who set up the machinery. The building was built and the machinery imported and kept there. Nothing else was done.

Q. You were asked to go and start it?—*A.* I went and fitted up all the machinery and started work.

Q. Simply on account of the reputation you made in connection with the Mysore Tannery?—*A.* Yes, that helped me.

Q. The output of the Mysore Tannery you said was 250 hides a day, what is it in Berhampur?—*A.* About 60 or 70.

Q. What do you expect to go up to?—*A.* I can go up to 200 hides a day.

Q. How many such tanneries will it take to deal with all the hides in India?—*A.* It will take about 200 or 300.

Q. Do you consider from your experience that tanneries are better worked on a very large scale?—*A.* They are much better worked on a very large scale, the larger the better.

Q. If you had an output like what you are speaking about, it would mean a large export business in leather?—*A.* Yes, in the leather industry I don't think it is possible to develop the industry merely for the internal market. The country is only importing a couple of crores of finished leather products. But really these one to two crores are products of 150 to 200 different kinds of tanneries in Europe. It is not a sound proposition for one tannery to do all the varieties now imported, as that tannery would fail. For instance, there are ladies' shoes imported, men's boots, mill leathers, harness, one tannery cannot be started to deal with all these kinds of things. Such a tannery would not pay merely by the multiplication of operations, the tannery would be killing itself.

Q. But India wants, let us say, harness. Do you suggest that the sound financial proposition is for India to make harness leather to a larger extent than it requires for its own consumption and export the surplus, and let ladies' shoes severely alone?—*A.* Yes, that was my experience when I started the Mysore Tannery. That was one of my reasons for having gone so slow. I started doing all sorts of leathers which could compare very favourably with the imported article, but I could not manage the business.

Q. What particular kind of trade would be most suited for India to take up?—*A.* Box sides, glace kids; because we have an abundance of raw materials.

Q. What are the tanned hides useful for?—*A.* For russet and combination chrome, etc. The raw hides, before the war, would go to Germany, and be converted into chrome leather, and a good lot was sold in London.

Sir D. J. Tata.—Where are all those fancy goods which one connects with Austria?—*A.* Now they are made in the West End of London.

Q. You said that a good lot of the tanned leather goes from Germany to London?—*A.* The Chrome leather which is useful for boots and shoes.

Q. You say that England is taking up that fancy leather goods business?—*A.* Yes, and they are doing it very well.

Q. And for that they import Indian kids?—*A.* Indian sheep skins and goat skins.

Dr. E. Hopkinson.—*Q.* With regard to the school you have working here, you employ no boys, I suppose?—*A.* The workmen also are taught there. I have not many boys like mills have, but chiefly grown up men.

Q. You state that the school is not directed to teach them tanning or make them better tanners, but to improve their moral qualities?—*A.* That means they become better workmen, because they are better men.

Q. And you have been satisfied with the results?—*A.* I am quite satisfied with the results, especially the lower class labourers who are inveterate drunkards. My school has weaned them from that habit.

Q. Are you intending to start a similar school in Calcutta?—*A.* It will come when I study Bengal conditions better.

Q. You think there may be a difference between conditions in Bengal and here?—*A.* There may be; up to now I find them the same.

Q. I think you said in regard to provision of capital that your experience generally was that it was not good for Government to guarantee interest?—*A.* I don't commit myself definitely to that, not having practical experience. There are recognised firms in Calcutta for whom if they want to start a business like this, the public would subscribe money easily enough; but the difficult thing is to convince these people that there is money in this business. When we do succeed in convincing them, they want to do the whole thing themselves, and we get nothing out of it.

Sir D. J. Tata.—*Q.* Going back to the question of experts, you say that it does not pay to start all sorts of things in one factory and that you would specialise in each?—*A.* Yes

Q. In oder to specialise and start, say, in fancy goods, how could you start, making them without first bringing in an expert to teach you how to make them. You say, "Let us learn from our own failures." But don't you think you would fail and continue to fail, unless you brought somebody to teach your men at first?—*A*. My experience is different. I have failed and failed, but now I find that I do not fail but succeed.

Q. It is certainly very laudable. But is it not better to get your success thoroughly by introducing foreign experts at the very start?—*A*. If by "success" you mean merely financial success, perhaps the process you suggest would be quicker. But by success, I mean, the chances of my countrymen becoming captains of industry and the chances of such a success are poor according to your scheme.

Q. You can combine both the systems?—*A*. I have no objection to that. I have no objection to an expert because he is an expert. I have strong objections to an expert because he comes and takes the initiative from me altogether.

Q. But if you hold the purse strings, and the expert only comes in as your paid servant, you can get rid of him the moment you have trained enough men to do the thing. The first thing is to introduce the industry and once you can produce the goods, introduce your Indian labourer and train him?—*A*. My experience is that the advantages and disadvantages would both balance each other, and the advantages would be in my favour.

Q. There are very few men who would persist in carrying on an industrial experiment?—*A*. Therefore, let Government pioneer.

Q. You said you did not want Government to pioneer?—*A*. I said I want Government pioneering. That is my whole point.

Mr. A. Chatterton.—*Q*. You say that Government have already done pioneer work?—*A*. Yes, in connection with my trade, and I do not want them to interfere any further. It has gone beyond the pioneering stage. Government pioneered my industry and the result is that you have got eight or nine factories in India, all in the space of ten years. The branch they took has made good progress.

Q. How could they do the pioneering unless they brought somebody to do the work at first?—*A*. We managed without experts in the leather industry—without any experts. We simply consulted an expert and paid him fifty guineas.

Q. You evolved the whole thing out of your own head?—*A*. It is not a question of evolving at all.

Hon'ble Sir R. N. Mookerjee.—*Q*. You just now said that Berhampur has not got a good name but a bad name. Why?—*A*. Because in 1908 it was started and up to 1916 it was not working.

Q. Since you took charge two years ago?—*A*. Not two years ago. I started working in February 1916.

Q. Is this a suitable time to make profit?—*A*. A very suitable time.

Q. Even then you have not been able to make more than three or four per cent?—*A*. Because up to October 1916, I had my boot factory. I went on losing money. In October 1916 I closed my boot factory and I had a loss of about Rs. 45,000. From October to January I make up more than Rs. 30,000 of that loss. It is now a commercial success as far as my knowledge goes, but my success is not of such a character as to make it impressive. I cannot go to the public and say that my concern is successful. It will take another three or four years to raise the necessary capital in Bengal.

Q. Still you are opposed to anybody starting this industry except yourself?—*A*. I cannot prevent anybody starting an industry. I am opposed to Government starting a pioneer factory in Calcutta.

Q. You said you had no difficulty in getting loans from the Presidency Bank. Have you tried that in Bengal?—*A*. No.

Q. Are you aware that your proprietor, the Maharaja, had difficulty in getting money for certain pottery works?—*A*. I don't know anything about his other works.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. You say, "The functions that I see ascribed to the industrial banks can be, and in fact, are being performed efficiently by the Presidency Banks who, as far as my experience goes, are ready to entertain and advance any business proposition placed before them. How can the Presidency Banks advance money on plant and buildings?—*A*. They cannot do that. I do not think it is advisable for any bank to advance money on any fixed property like that, because the money would be locked up. It is a question of money, of Government borrowing money for financing. Government can as well raise loans and advance money.

Q. Do they want it for industrial purposes?—*A*. This comes under the same thing. I can either get borrowed money or pay interest on borrowed money. If Government guarantee interest it simply means that they borrow so much money.

Q. Do you know that Government have no control over Presidency Banks under the Act?—*A*. How does it affect my position?

Q. Suppose in Madras and Calcutta there are no Indian directors on the Banks, Government cannot force those Banks to have Indian directors, and supposing there are Indian directors of these industrial banks, don't you think they would have more sympathy with Indian industrialists?—*A*. I cannot say. But granting that it is desirable for Indian directors to be on the Board, that can be done very easily by altering the Act.

Q. Do these banks generally finance export trade?—*A*. They may. What harm in that?

Q. You think that the Presidency Banks should give loans on machinery and plant?—*A*. No, I do not want that. If I wanted to start an industrial concern I must have money for buildings and machinery.

Q. But supposing as it done in Mysore a chemical factory has to be started and they have only land?—*A*. Government lend them money on the hire purchase system. Let Government lend me money. I am not opposed to that. If Government want to lend money they can lend it direct. Why through the Presidency Banks?

Q. Have the Presidency Banks a larger scope for advancing?—*A*. It can be taken up by Government. Why start another bank? I do not want another bank. My whole position is that attempts should be made to reduce the rate of interest.

Q. If the industries are flourishing they can have credit as in Japan?—*A*. Look at the lot of pioneering the Japanese Government have done. Our Government has done nothing.

Q. They have established special banks for those concerns, to which you are opposed. They are doing these things through those banks. Suppose Government help is given to industries, are you in favour of having Government control in the shape of Directors?—*A*. To the extent they have contributed funds, not beyond that.

Q. But here you say, "I can say that the benefit to the concern or to the Government from the presence of these directors on the Board has been nil"?—*A*. That is a particular case referring to particular circumstances. I want them to have a definite position. For instance, the directors must not be tied down but must do as they like. Choose a proper man to represent your interests. Don't go and insist that he must communicate with you in any position that arises. Supposing there is a big subject discussed before the meeting. These Government directors find themselves in a fix. They cannot give their opinion. They go and consult Government. That means delay.

Q. Then, about the Board of Industries you do not want a Board of Industries?—*A*. To start with, I do not want one anywhere in India.

Q. Do you know whether there are Boards of Industries in the country and how they are working?—*A*. I know something about the Board of Industries in Madras.

Q. What is the constitution?—*A*. It is more or less unofficial. I refer to the Bureau of Industries.

Q. Supposing there is a Director of Industries appointed by Government and a Board to work with him, do you think that is advisable?—*A*. To start with, I do not think so, because it would make progress slow.

Q. Is that your experience? Do you know anything about it?—*A*. No. That is my opinion.

Q. Isn't there a Board of Industries in Mysore also?—*A*. I do not know. There is a Commerce and Industry Committee.

Q. And they work in co-operation with the Director?—*A*. I am not competent to give you any opinion about that.

Q. You want Trade Representatives all over the world, in all the countries?—*A*. Yes.

Mr. C. E. Low.—*Q*. If you had an Indian trade representative in other countries, would that have helped you in selling your leather?—*A*. It would help me very much.

Q. In what country?—*A*. I could have shipped my stuff to America, or to Russia. It would have been of practical assistance to me.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. You want the Director of Industries to be under an Imperial Director. That would be an all-India thing?—*A*. My object was only to prevent lopsidedness.

Q. You say, "First, the factories must be created and then the necessity will arise for technically trained men." Supposing the Government started technical schools for half-timers and they were taught the industries, don't you think that would be good?—*A*. I have thirty people in the leather trade. Who have gained experience in other countries?

Q. Do you know of a factory in Calcutta run by Dr. Nilratan Sircar—a factory which is making boots and selling them at good profit?—*A*. Yes. I do not say that the boot making industry is unprofitable. I say it is unprofitable in Bangalore.

Q. Do you want Government to pioneer big or small industries?—*A*. Big or small—anything. Where should we draw a line? I do not know whether you consider leather industry a big industry.

Q. It is a big industry, but the pioneer factory should be on a small scale?—*A.* Yes, consistent with the class of factory you want to pioneer. For instance for goat skins the factory must be a big one.

Q. You think that experts should be asked only to give advice?—*A.* Yes.

Sir F. H. Stewart.—*Q.* About this point of having Government directors on the Board you are not against that on principle?—*A.* No.

Q. But your point is that they should be men of practical business experience?—*A.* Yes. And they must be given absolute discretion. If Government does not agree with their policy for the first few years it is open to them to change those directors, but once they are appointed Government must not have anything to do with them, or interfere with them.

Q. You are not against leather experts in the case of new industries?—*A.* I can only give you my experience. My experience of experts has been very bad.

Q. But the position is that you, in your particular industry, have worked very hard and have now made good, but that is not a reason for not having experts in other industries?—*A.* I can only speak with reference to my industry. The expert's advice has put me back and I am mortally afraid of them.

WITNESS NO. 273.

MR. P. ANANTAKRISHNA JOSIYAR, *Silk Merchant, Kollegal, Coimbatore district.*

WRITTEN EVIDENCE.

The silk ir

Although mention has often been made of the silk industry in India even in early times recent experiments really started with those of Dr. James Anderson in 1771 by the planting of mulberry bushes at Nungambakum near Madras where the Bengal worm was acclimatised and the new breed named *Madrasi*. Other expensive but fruitless efforts carried on by the Madras Government at Vellavedu put a stop to all further legitimate endeavours for some years and the time seems to have arrived for a revival of the industry in all its bearings now.

The industry is localised in Salem and Coimbatore districts, both of them bordering on Mysore territory, so renowned for silk in earlier times. It is estimated that in Kollegal taluk alone there are about 14,000 acres of land under mulberry cultivation. But it is sad to notice that the silk industry is gradually declining.

The chief reason for the decline is that the mulberry grower and the silk worm rearer happen to be different sets of people, and the worm-rearer has to rely on the mulberry grower for the very life food of his worms, viz., the mulberry leaves. The mulberry grower does not grow on a scientific system and the leaves he brings seem to be responsible for the diseases common to the worms. The rearers are, as a class, so indigent that they cannot dissociate themselves from the mulberry grower. Until the silk worm rearer grows his own mulberry in his homestead and supplies healthy leaves to his worms at the proper time and in proper condition there is not much hope for him It may not be quite practicable to help the silk worm rearer to be a mulberry grower at the same time, but it is quite reasonable to expect the Government to offer such assistance to the mulberry grower as will enable him to grow healthy leaves and profit not only himself but also the rearer of worms.

With a view to do this model mulberry farms ought to be started and the agricultural operations there should serve as lessons to the ryots of the village. There will then be no reason for the rearer to attribute his failure to the mulberry grower when the latter has learned to supply him with healthy leaves. Irrigation facilities may be afforded in certain localities where they are wanting now.

Turning to the rearer of worms, we hear him constantly complain that he cannot get healthy eggs and has no good sources of supply. In all sericultural countries the production of seed cocoons has been an enterprise which the Government itself has pioneered regardless of cost. A grainage on the model of those started in Mysore and elsewhere may be opened in Kollegal taluk and the method of rearing good worms demonstrated there and healthy seed cocoons supplied therefrom. It is only thus that people, who are now much depressed owing to the spread of disease among the worms they rear, can be cheered up. There is at present one Sericultural Inspector who, though he does good work, is unable in the nature of things to cope with the demand for seeds. There should be at least one very large grainage, or a number of smaller ones, that can abundantly supply all the ryots of the taluk with healthy seeds. A number of people may be trained to rear silk worms on scientific lines and be able to discover by the microscope when they are attacked by disease and so forth.

It is time to investigate the condition of mulberry cultivation and the rearing of healthy worms. The next matter to be attended to simultaneously with these will be the condition of *reeling*.

Kollegal is well known on this side of India for its silk fabrics and, in spite of fairly large areas of land being under mulberry cultivation, the raw silk needed for making fabrics has been imported from Mysore to the extent of 35 lakhs of rupees annually. This is a reflection on the industrial activity of the country. The reason is not far to seek. There are not many people pursuing the profession of reelers and the few that are in it have not sufficient cocoons to reel nor do they reel in a manner that is profitable to them. It has been estimated that ten families of cocoon rearers are required to keep one reeler engaged and therefore to give sufficient occupation to reelers there must be sufficient cocoons. Until the health of worms can be improved, as stated elsewhere, adequate cocoons cannot be had for the reelers. The few rearers that are producing cocoons are in such straitened circumstances that they generally look to the next man that can pay them for their cocoons so that they may buy their day's bread. This is how the enterprising firm of Messrs. Louis Payne have been taking away the available cocoons of Kollegal for exportation to Berhampore in Bengal. If improved methods of reeling be taught so that the yarns are free from knots and uniform it is possible to have our own silk for our fabrics but also possible to be able to export raw silk. Other matters requiring simultaneous attention with the above are the dyeing of silk, the treatment of waste silk and the rearing of Eri silk worms. These are matters that require investigation by experts. This would lead to a simultaneous regeneration of mulberry cultivation, silkworm rearing and silk reeling, the three component parts of one of the greatest industries of India.

Roads, railways and waterways.

Q. 97-100.—Howsoever an industry may flourish, it is doomed to fall if it does not develop a thriving commerce. Now the essential conditions for a thriving commerce are to be found in the facilities for transport. Such facilities are greatly wanting in this part of the Presidency. Kollegal, as the centre of the silk industry not only in Coimbatore District but in surrounding parts of Mysore Province as well, is an inland tract, 40 miles away from the nearest railway station. This greatly hinders the silk and other trades. There is great difficulty in sending local produce to and getting foreign produce from the railway station, and the transit charges for this short distance alone are heavy. A large trade in grain and other produce is now carried on by bullock carts over a distance of roughly a hundred miles via the Hassanur and Dimbam ghats which open into the plains to the south of the Mysore plateau. Maralli, a place in the Mysore province, about 15 miles from Kollegal, being situated on this line of communication, commands a very heavy trade once a week. It is only silk and other parcels that are sent by rail to save time; the transit facilities therefore are very insufficient now. However means are not wanting to improve them, for when the proposed railway line from Erode to Nanjangud is opened, it will provide easy and cheap transit for all the silk produced in the Kollegal circle besides opening a wide gate for a lively general traffic. This project has long been under contemplation. When it will be an accomplished fact remains to be seen.

In considering the means of transport, it will not be out of place here to remark briefly on what seems to me to be an organised form of theft of goods sent even through the existing railways. I can say that the parcels sent by railway goods or passenger trains are systematically opened, parts of their contents are mysteriously removed, equal weights being substituted by pieces of stones or such stuff. Through this fear the Kollegal merchants, not to speak of others elsewhere, are put to further loss by being obliged to pack their valuable silk parcels four or five times over, thus increasing their weight and freight. Even such parcels very rarely escape being tampered with. Instances of this kind are too numerous to need details here and the Commission itself may be aware of the recent Gadag case of the theft of a whole parcel of silver cash worth Rs. 6,000 or so. The other case of theft of some bags from a running train, especially when there was a police constable present in the train, remains still a mystery. It is therefore my aim, in the interest of the brother traders, to implore the Commission to make such proposals as should tend to the prevention of such thefts. Of course, the cheated consigners may prefer complaints to the railway authorities; but in most cases they get no redress since the railway rules of consignment are such. Some such arrangements as the following seem to me to be likely to check these thefts:—

1. The appointment of some responsible officers, other than railway servants, as supervisors of goods sheds with power to visit them at any time, day or night.

2. The railway companies should on receipt of bona fide complaints make thorough and regular enquiries. Their present enquiries appear to me to be formal as they are based upon mere technicalities.

3. Travelling parcels and luggage inspectors must be appointed by the railway companies. These inspectors must be empowered to visit any luggage room or goods shed at any time and see that parcels are not unnecessarily delayed.

Hydro-electric power surveys.

The electrical installations at Sivasamudram about twelve miles from this town, are too well known to need any special mention here in connection with hydro electric power generation. The Ganganchuki and the Barchuki falls commanding a height of over 100 feet attract visitors from every where in the Presidency. About 40 miles down the Cauvery, near Make-dhat, there are still said to be facilities enough for erecting another generating station. A survey of this is worth the attempt.

ORAL EVIDENCE, 14TH FEBRUARY 1917.

Mr. C. E. Low.—*Q.* What does your business consist in?—*A.* I purchase raw silk and weave it. I do silk business generally.

Q. Do you purchase raw silk from the actual producer?—*A.* From the growers.

Q. Do you give advances to them?—*A.* I give them advances, and also purchase directly from people.

Q. You sell the silk to weavers?—*A.* Generally I get silk woven and export the woven stuff. At times I sell the yarn to the weavers.

Q. Have you looms working in your house?—*A.* I had 22 looms. During the last four or five years, particularly since the beginning of the war, my weaving branches began to fall gradually. I stopped this business completely six months ago.

Q. Why have you stopped?—*A.* The price of silk is rising in value and I could not get dyes.

Q. Do the growers from whom you purchase silk live near Kollegal, or do you send men out and purchase from other places?—*A.* From growers in Kollegal taluk and also from the neighbouring villages in the Mysore province. Villages that are within five miles from Kollegal taluk.

Q. How many years have you been in this silk industry?—*A.* I have been dealing in silk for the last forty years.

Q. Have you seen any falling off in the quality of silk produced?—*A.* The silk has deteriorated.

Q. To what reason do you attribute the falling off in their quality?—*A.* Due to diseases in the silk worms.

Q. Have those diseases become more frequent in recent years than they used to be?—*A.* Yes. They are more numerous and they are worse.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* Is the handloom weaving advancing or going down?—*A.* It is declining since the last ten years.

Q. Is foreign raw silk much used now in the handlooms here?—*A.* Foreign silk though inferior in quality is used much more now than before, because it is cheaper than local silk.

Q. Are the local dyers dyeing with vegetable dyes made in the country? Are they using them more in the place of the foreign dyes which they cannot get?—*A.* There are only three colours of local dyes, but the others are all foreign dyes.

Q. Are people from other parts of India coming and competing with you in your trade, that is, marwaries and others?—*A.* People from other parts of India did come to Kollegal and compete with us six years ago but the industry has declined and they are not also coming.

Q. We were told in Coimbatore that marwaries have come up there, that the local people have been ousted, that they advance money and that the local people are suffering under their competition?—*A.* It is not so here.

Sir D. J. Tata.—*Q.* Where do you get the silk that you use for your weaving purposes?—*A.* It is local Kollegal Indian silk. I was also getting Chinese and Japanese silk.

Q. You are close to the Mysore province, and do you get anything from there?—*A.* It is close to us, and I buy silk grown in that State.

Q. You say foreign silk is cheaper. Is it cheaper quality for quality, or is it the inferior silk which is sold cheaper, that comes into the market?—*A.* They are not cheaper quality for quality. Foreign silk is inferior in quality as it wants elasticity. The local silk takes a better dye and lasts longer. It is stronger also.

Q. Then can't you afford to pay a better price for the local silk?—*A.* It is not reeled properly, and that is the reason why we have to buy foreign silk.

Q. The Mysore Government has been making efforts for a long time to improve the silk industry of their State. Have they not had any effect upon the local silk so far?—*A.* No officers of the Mysore State come to us and give us guidance, and the silk that is raised is taken off to Chennapatnam and other places.

Q. You are buying local silk to some extent. I understand that the Mysore Government is making efforts to improve the quality of silk, that they have succeeded to a certain extent, and that it fetches now a much higher price than local silk used to. Is not the quality better than you used to get in the old days?—*A.* I have not been able to get any silk from Mysore.

Q. Why don't you try to get it?—*A.* The silk of Mysore is, I hear, only slightly better than ours, and no doubt we will go in for it when there is an appreciable improvement in its quality.

WITNESS No. 274.

MR. MIDATHALA HAMPIAH, *Messrs. M. Hampiah & Co., Proprietors, Cotton Ginning, etc., Factories.*

WRITTEN EVIDENCE.

Weaving.

My experience in this branch is chiefly confined to coarse cloth products of the handloom industry which was in a flourishing state hitherto. Of late this trade was found impracticable to compete with mill made coarse cloths which are sold cheaper. Weavers of handlooms in consequence have to give up their profession and the trade at present is 25 per cent of what it was some time back. Suffice it to say, that the weaving population in villages and towns where there are no mills are in a deplorable condition with little or no livelihood whatsoever. Mills with up to date machinery and plant, subject to proper management are capable of turning out coarse products at cheaper rates than the handlooms. Not only are mills competing very keenly with coarse products in the absence of want of facilities for turning out finer count products profitably on account of prohibitive duty on finer counts, but the demand for coarse products in fact is decreasing owing to advance of civilization. As civilization advances, the taste for nicer products naturally develops with the result that in course of time the handloom industry will have to be shut down completely. To meet the requirements of people to some extent at least, there is scope for improvement in this line. There are not enough mills in India, except in big commercial centres to attract the weaving population though raw material is available abundantly to feed any number of mills. The erection of mills in all important centres with Government subsidy would improve the industry a good deal. People are not rich enough to undertake the enterprise independently besides being ignorant of industrial enterprise. Government would do well to establish demonstration weaving and spinning schools in all important centres, train weavers and others interested in the art of weaving and spinning and encourage the erection of mills by private enterprise, Government guaranteeing to make good any loss that may accrue if the dividends fall short of 6 per cent on the paid up capital. Improved handloom industry also could be encouraged with Government aid by supplying up to date handlooms, teaching the weaving population the art of handling the looms and when sufficient men are available, Government should encourage local concerns with all possible facilities to make this industry successful where there are no weaving and spinning mills. To begin with demonstration schools in all important weaving centres would do good and once an impetus is given people will begin to realize the benefits that may be derived from the knowledge they gain from the schools.

Cotton ginning and pressing.

The mania for ginning factories of late has developed to an extraordinary extent without any regard to crop estimates. Factories have been opened in almost all centres of cotton production and in fact in almost every village. Skilled mechanical staff is essential for ginning factories. Good fitters are hardly available and those few that are available in the Presidency are not well up to manage ginning factories. Many factories actually suspend operations in the heart of season for want of good engineers and fitters. Taking the ceded districts as a whole Anantapur and Bellary districts are flooded with ginning factories, but most factories do not turn out as much work as they are expected to do chiefly for want of trained mechanical staff and for other reasons such as want of required capital to carry on the trade and competent supervision and management. It is very desirable that an up to date school for training engineers, fitters, blacksmiths, boilermen, etc., should be opened in a convenient centre in the ceded districts in order to train a sufficient number of men to meet requirements. In the management of ginning factories the scarcity of labour is also keenly felt almost every where and the wages of labourers have advanced by 50 per cent during the last four years with further chances of increase by 25 per cent more. The extension of ground-nut cultivation throughout the Presidency absorbs labour a good deal and the difficulty at times is acute. To relieve this in the first instance, emigration of labour from this Presidency should be stopped immediately and distribution of labour from non-industrial districts to industrial districts should be encouraged by Government in a way equitable both to the employer and employee. Government should encourage labour colonies in industrial districts with free grant of sites for houses and free materials for erection of houses. The rules of the Factory Act are too rigid for the smooth working of ginning factories in general, particularly of small factories managed by people without English knowledge. The registers required to be maintained do not serve any good purpose but worry and annoyance. Sanitation and general health may of course be subject to inspection from time to time but the general rigid principles on which Inspectors insist at present should be relaxed a good deal. People in general are not rich enough to arrange for the proper management of cotton industry and have to depend upon the mercy of exporting houses. Industrial banks should be opened in convenient centres with ample godown accommodation and liberal advances on turned products should be extended on reasonable interest to afford facilities to dealers to market their stuff at a reasonable price at convenient intervals subject to fluctuating tendencies of markets. This arrangement would relieve all honest merchants from the clutches of marwari money lenders whose rate of interest and terms are such that they do not leave anything in the way of fair profits.

Pressing factories.

The existing factories in the Presidency in general are working satisfactorily and more factories are generally needed in some important centres for want of enterprising spirit on the part of the people themselves. Indian capital is generally shy to start limited liability concerns and it will take a long time to appreciate this spirit in the rural districts. Want of sufficient education is the chief cause of this distrust among people and could not be remedied all at once. Technical and industrial education should be encouraged in general. All the difficulties expressed for the proper management of ginning factories would apply to this as well.

Ground-nut shelling.

Ground nut cultivation is improving by leaps and bounds, so also ground-nut shelling machines in almost all large villages. Shelled kernals are exported to Marseilles and other European centres for oil and other purposes. Government would do well to erect some up to date demonstration refining mills in good ground-nut centres and arrange to develop the oil industry as a temporary measure with a view to hand over these mills to private enterprise when people really understand the value of the oil industry As ground-nut cultivation is expanding beyond expectation it is probable that people will forget about their foodstuff cultivation. This year, taking Anantapur district as an example, I can say, ground-nut cultivation has increased by 50 to 75 per cent. To market the increased produce besides export demand there is much room for improvement in the oil mill industry and the erection of mills, either solely by Government, or by Government aid, would develop this trade a good deal. It is also desirable that Government should circulate pamphlets in the vernaculars of the Presidency as to the use of these seeds in Europe and the possibilities of meeting those requirements in India.

In conclusion, I beg to submit that Government should encourage Indian indigenous industry so as to enable India to use her raw products rather than to fall a prey to exporters.

NOTE.—*Witness did not give oral evidence.*

WITNESS NO. 275.

MR. V. RANGASWAMI AYYANGAR, *Officiating Director of Industries, Mysore, Bangalore.*

WRITTEN EVIDENCE.

At the present time there is unmistakable indication that a wave of industrialism is passing over the length and breadth of the land. There is a good deal of unrest and desire to participate in the hidden wealth. Beyond the desire and the impatience nothing tangible has been effected. In industrial matters, India is like a baby and has to be led by a devoted mother. Naturally it is to the Government that the people look to for guidance. The help that Government can give can be classified under various heads and my remarks will be confined only to the following:—

1. Technical aid to industries,
2. Training of labour and supervision, and
3. General official administration and organization.

A good deal of work has been done in Mysore during the time that the Department of Industries in Mysore was presided over by Mr. A. Chatterton. My assistant Mr. Ranganatha Rao Sahib who has been in touch with these all along will, in his evidence, give an account of what has been done and as such I shall not waste time by covering the same ground. His written statement gives a very complete account of the various activities of the State in the direction of promoting industries and some of his observations afford much room for thought.

Technical aid

This is a very useful form of aid and it may consist in —

(1) establishing demonstration factories for the purpose of experimenting with the local materials under local conditions for the purpose of establishing new industries; and

(2) providing the services of experts for helping new industries.

Demonstration factories.

Demonstration factories are needed to introduce industries which are new to the country. In a backward country like India a demonstration factory is very useful, in that it affords an object lesson to the capitalist. Nothing convinces a doubting man more than actual seeing. Moreover, it is a notorious fact that the difficulties inseparable from all new undertakings in the earlier stages are the ones that are most difficult to endure and to which many concerns succumb. A demonstration factory that overcomes these difficulties and reduces the operations to definite standards and simplifies the work may be viewed in the light of a *public work* conceived for the benefit of the people. Viewed in this light there can be no doubt that it is a legitimate work for any Government.

These demonstration factories to be of real use should not be of the type of simple enlarged laboratories. They should be real live factories working on commercial lines. This does not mean that they should be laid out on a grand scale. Economy should be the watch-word, but it should not be carried too far. The limit when any factory ceases to be a real factory is easily reached and should be avoided.

Too much care cannot be taken in keeping accurate records of their operations so that the information may be available for all times to come. Such factories should be under the charge of a responsible official whose experience should be available for future occasions. I would also lay down that a reasonably long period should be allowed for the experiment but there is no objection to fixing a maximum limit; care should also be taken in the selection of the workmen as none but the best and the most steady must be employed in these premier factories.

Expert advice.

Another way in which Government can aid industries consists in engaging experts and placing their services at the disposal of the public under certain conditions. Here again, Government as representing the interests of the country as a whole are in a better position to procure the services of competent men and utilize their services for the common benefit of a community. I do not think it is desirable for the Government to lend the services of their experts solely to private firms for any length of time. The functions of the expert should be limited to furnishing plans and estimates of cost and assisting industries in other directions such as procuring suitable machinery, operators etc.

The expert should also arrange to periodically inspect the concerns during erection and help the management in getting the services of technical men and skilled labour. I consider that no fees should be charged for the help so rendered by the expert. The results of researches made by Government experts should be regarded as public property and should be published by the Government for the information of the public.

As regards research work, I am of opinion that such work should be carried out in the country in collaboration with men who have acquired some local knowledge. The success of any industry is easily modified by local conditions and it is unnatural to suppose that such factors will be fully appreciated when the researches are conducted thousands of miles away. An ideal arrangement will be for such researches to be started in this country and worked up as far as it is possible to do so with the men and means available. Their further prosecution in England may be resorted to for the purpose of completing and giving the enquiry a finality.

Co-ordination of research.

I do not consider that the Advisory Council for Research in the United Kingdom can give assistance to Indian industries. It is almost certain that they will have their hands full for a number of years with the problems connected with their own industries. I am afraid Indian questions are not likely to be treated as purely Indian problems and complications may arise. It is however very desirable to have such a body in India, but it is likely to be very expensive. An advisory board to be of real use to the country should be free of red-tapism. It would be a grand thing if India could raise sufficiently large capital and form a trust and maintain a first class research institute. If India will make an effort to help itself, then I have no doubt that the British Government will also lend its help. At present its task is rendered doubly difficult by the backward condition of the country and opposition from the manufacturers in England whose interests are sometimes affected. An Advisory Council for Research for Indian Industries must therefore be promoted by the people themselves and its work must be swayed by no other consideration except that of India's interest.

Training of labour and supervision.

In the organization and working of any industry the part played by the human agency can be classified under three heads:—

1. Expert supervision,
2. Subordinate supervision, and
3. Operation.

The problem in India is to devise a scheme for the training and supply of the human element under these heads.

It will be a very long time before India can hope to supply its own wants under the first item and it will suffice therefore if we turn our attention to items 2 and 3. When the problems connected with items 2 and 3 have been solved and the [illegible] progress in the establishment of new industries, the problem of training its own experts will be much simplified and till then it will be necessary to resort to other countries for our experts.

I do not consider that much good has resulted or is likely to result by sending our young men to foreign countries for being trained as experts. There are many difficulties that beset the path of a young man that aspires to become an expert. Young men that go abroad are generally in a hurry to return home and during the comparatively short time they stay outside they often try to learn too much. The time is indeed too short when we consider that in most cases these young men start without any previous training. It is also doubtful if they ever succeed in getting an insight into the real business. Many labour under the delusion that a mere knowledge of a process is all that is necessary to transfer a man into an expert. This is a sad mistake. Patience and long application alone can make a man an expert and it is only when industries are actually established in our country that the elements conducive to a good training will be forthcoming. It is to these factories that our young men should look to for their training. It is futile to suppose that other nations will divulge the secrets of their trades when they know that we may some day compete with them. We must toil and find out the secrets ourselves.

As regards items 2 and 3 the number required is rather large and means must be found to train the men locally. In the absence of even a fair number of established industries the problem is somewhat difficult and costly. But as there is no doubt of the urgent need for trained men we must face the problem at some expense.

Whatever class of men we mean to train, be it 2 or 3, our object is the conversion of unskilled labour into skilled labour, the difference in the training under the two grades being only in the details. If we analyse all that is comprised in the training we may classify it under two heads, namely, teaching and training.

By *teaching*, I mean the preliminary stages in the earlier career of a worker when the pros and cons of all the operations have to be explained with a view to developing his powers of observation and assimilation. During this period he is engaged only in standard exercises, the aim being more to familiarize him with the tools and their applications. All refinements are purposely left out. I have no doubt that a systematic training of this sort will enable a youth to accomplish more in one year than what he would have done in three years in the ordinary course of events if he had been left to himself.

By *training* is meant those phases of training that could be learned effectively only in factories and workshops that work under commercial conditions and in which the element of time is an important factor. The learner is old enough to reason for himself and be profited by the example of his experienced brethren. More attention is also paid to details and refinements. I have no doubt that a systematic training of this sort will enable a youth, to accomplish more in one year than what he would have done in three years in the ordinary course of events, if he had been left to himself.

Unfortunately it is not possible to draw a clear line to demarcate where one ends and the other begins. It has to be left to the individual's judgment. It is not the same even in all industries. But a recognition of the principle that there is a limitation to what can be taught in schools is the chief thing.

I am of opinion that Government must undoubtedly undertake industrial education and for this purpose they must establish industrial schools in the same way as they do in the case of general education. What particular industries should be taught must be decided after taking local conditions into consideration. But there is no doubt that Government must recognise their responsibility in the matter. Every large town should possess an industrial school in which one or two industries are taught.

The question of practical training is really the sphere of the industries themselves. Where factories exist the youths who have undergone preliminary training in industrial schools will find no difficulty in gaining admission into these institutions and acquiring practical efficiency. But unfortunately in India, the facilities for this kind of training are very limited at present and the people look to the Government to come to the rescue.

For this purpose, I strongly advocate that Government should start a certain number of model trade schools for selected industries. These schools should be laid out as so many miniature factories so that the training afforded may be as similar as possible to factory training.

It should not be supposed that such a training can produce finished workmen. But there is no question that this would solve the labour problem to no small extent, for it will be admitted that the man who starts an industry will find his work much easier than it would have been the case if he had to rely on altogether untrained labour.

The nature of the training must necessarily be different for the two classes of men and in the clear understanding of what is essential a good deal of the success of the undertaking depends. We must aim at producing a class of men best fitted for their respective functions. In Mysore the Chamarajendra Technical Institute has been started for the training of men coming under class 3 and the Bangalore Mechanical

Engineering School, for the training of men under class 2. The Chamarajendra Technical Institute trains boys, in arts, industries and crafts. It is divided into two departments, viz.—

(1) Industries and Crafts,
(2) Arts.

Industries and crafts.

The curriculum in the Industries and Crafts Department is mostly practical but an hour daily is devoted to drawing and general education, viz., reading, writing and arithmetic. Boys whose ages are between 13 and 16 are admitted, preference being given to boys who possess some elementary knowledge of reading and writing. The period of training is one of five years. They are also given scholarships varying from Rs. 2 to Rs. 6.

Arts.

This department is divided into 2 sections, viz., the training section and the workshop section. In the training section which covers a period of 3 years the boys are given standard exercises and their work is very closely supervised by the teachers. They also attend the class room for one hour daily where they learn drawing, reading, writing and arithmetic. This period corresponds to what I mean by " teaching."

When the boys have attained a certain amount of proficiency they are transferred to the workshop section for a couple of years where they work with more advanced workmen and are paid wages for work done. This corresponds to practical training. Being limited in its operations the workshop section in the Institute does not afford the same scope for training as a large private workshop. But there is no question that the feature of payment for work done acts as a stimulus and gives the training a more practical nature. If we had suitable private workshops this section could be abolished.

The Mechanical Engineering School at Bangalore is devoted to the training of men coming under class 2 and it trains them in mechanical and electrical engineering and motor mechanics. The course is one of 3½ years, out of which 2½ years are spent in the school and one year outside in a recognised workshop or factory.

The usefulness of the school will be considerably enhanced if we add to it another branch, viz., " chemical engineering."

Boys whose standard of education is not less than the 3rd form are eligible for admission. They work from 7-30 a.m. to 5 p.m., with an interval of 2½ hours at midday. On an average it may be stated that the boy spends two hours daily for drawing and class-room work and the rest in the school workshop. There are 150 students on the roll. Boys who are natives of Mysore do not pay any school fees. But students coming from outside have to pay Rs. 3 per month in addition to a lump sum of Rs. 20 per year as workshop fees.

Government awards 20 scholarships of Rs. 8 each every year tenable for the whole period. But in the case of students who are sent outside Bangalore for their practical course, the scholarship is exchanged for a subsistence allowance of Rs. 12 or 15.

The curriculum of studies has been divided into two grades higher and lower, specially with a view to suit the conditions prevailing where boys of varying general educational qualifications are admitted. Students whose educational qualification corresponds to the fifth form and below are admitted to the lower grade, while the students of the sixth form and above are admitted into the higher grade. The essential difference in the courses is that in the higher grade there is a little more of book work; but care is taken that the boy's head is in no case stuffed with a mass of useless matter. A conspicuous feature in the school is that from the beginning the dignity of labour is impressed upon the minds of the students and all tendencies to prefer the desk to the work-bench is discouraged. The results have been so far encouraging and there is reason to be glad that the school has been able to produce the right sort of boys.

As regards the agency for the management of these schools there is a good deal of difference of opinion. There is no doubt that a student of industries would be better off if he was under the supervision of men who are familiar with the industrial world. If we adopt my classification of the periods into " teaching " and " training " it will be readily admitted that the second period, viz., " training " must as a matter of course be under the supervision of the Director of Industries who alone can provide the necessary facilities. But as regards the " teaching " institutions, a good many are of opinion that they may remain in the Educational Department. But I consider that it is not the best arrangement. It will be far better if the industrial education can be put on an independent basis under a first class educational officer with special experience in this line. As the department will be too small to be constituted into a separate one it may, with advantage be attached to the Industries Department. But I consider that it is very essential that the methods pursued in the " teaching " schools should be in the hands of men who know how to shape young minds. They must no doubt know their trades well, but that they should be good educationalists is even more important.

Official organisation.

The development of industries in any country is of vital importance to it. But unfortunately owing to external competition the problem of fostering its growth in a backward country becomes complicated and is not free from political considerations. Whatever assistance Government can render has to be decided after due consideration of these influences. There are however directions in which no such difficulties need exist and there is no doubt that a Government Department will find free and ample scope in those directions. It is therefore desirable to define beforehand the limitations to the activities of the Department of Industries and unless this is done the work of the department is not likely to develop on sound lines. Half-hearted endeavours and unfinished experiments leave a very bad impression behind and breed discontent in the minds of the people. The policy of the department should not change with the personnel. I am afraid that at present a good deal of misconception exists as regards the working of the department and people are led to hope far too much. A list of industries which the department is prepared to develop should be published and the department itself should be organised for these specific industries.

As regards those industries the promotion of which is fettered by other factors, such as fiscal, political and commercial, much good can be done if a settlement could be arrived at. There is no doubt that such questions can be best dealt with by an Advisory Board consisting of experts and business-men. Once such difficulties in the matter of any particular industry has been solved satisfactorily, Government ought to find no difficulty in taking it up under their care. If the Advisory Board be carefully constituted and if it includes in it a fair number of Indians then I am sure capitalists will have more confidence and industries will thrive better.

A Government Department for the promotion of industries may therefore consist of—

1. A Director of Industries,
2. A staff of assistants, and
3. An Advisory Board for the deliberation of questions. This Board should consist of the leading citizens and merchants. It need not necessarily be an expert body.

The Director of Industries should have fairly wide powers and the department should have its own budget. He must be free to employ and consult experts.

It is difficult to lay down definitely what his qualifications should be. There is no doubt that an officer's fitness to occupy the position of the Director of Industries has to depend upon his possessing special qualifications, viz., mechanical engineering, scientific training and business capacity. It is also essential that he should be able to move with the people and win their confidence. These are the qualities not easily found and hence too much care cannot be exercised in the matter of selecting a suitable officer.

ORAL EVIDENCE, 14TH FEBRUARY 1917.

Mr. C. E. Low.—*Q.* You say in your note that "unfortunately owing to external competition the problem of fostering the growth of industries in a backward country becomes complicated and is not free from political considerations." What are you referring to when you allude to political considerations?—*A.* When we subsidise or when we give special grant to any Indian industry, it may be that you are enabling that industry to compete with some other established industries either foreign or home industry.

Q. I do not think that one need worry oneself about foreign industries but the home industry in the place itself. Do you think that might become a political consideration?—*A.* I refer to industries in England and it may be in allied countries also.

Q. You distinguish between a demonstration factory and a pioneer factory?—*A.* I think there is hardly any distinction between a demonstration factory and a pioneer factory. I do not attach much importance to a demonstration factory that only shows how the thing can be produced. When I was writing I had in mind the fact that any factory could show how the thing can be produced and the important thing is to show how the concern can be made a financial success.

Q. And to what extent do you think that a factory like this should be continued in order to train the staff?—*A.* I would not lay down any hard and fast rule. Suppose a factory has been in good working order for about a dozen years or ten years, I dare say that by that time it would be possible to train a set of men who will form a nucleus for a bigger army of men for similar work.

Q. The obvious objection taken by several witnesses to Government maintaining a pioneer factory beyond the point at which they have shewn it to be commercially successful is that they will be unfairly competing with any other concern that may start and that they may also deter other private concerns from starting for fear of Government competition?—*A.* But at the same time there is this object to be kept in view, namely the training of men locally. And for that purpose we ought to continue the factory for some time longer than the stage at which it can be taken to be commercially successful. As soon as we find that we have got enough men trained in the country I am quite willing that the factory should cease to be a Government factory.

Q. Can you suggest any means for minimising the objection between such a factory kept on for that purpose, namely a pioneer factory for instructional purposes, and the private concerns that may be started?—*A.* I would see that the rule is laid down, that a pioneer factory should not be on a big scale, more than what is necessary to make it a fair working factory. It need not be a regular concern run with an idea of making a huge profit.

Q. It was stated by a witness this morning that instead of employing outside experts to work out and show how the processes should be done, it was better for the men to work out the thing themselves in a pioneer factory without European expert assistance?—*A.* I do not think I shall advocate such a policy. What I would say is that if we have not got an expert in the country, a real expert, we ought to import one. The expert should be put in charge of the pioneer factory and he must train the local men.

Q. The witness' point of view was this. It is much easier to get an effective factory training and also training in the responsibility of the business for the Indian staff in cases where they work out the thing for themselves in a pioneer factory. And he also stated that he personally received very little assistance from European experts because the local difficulties that they had to deal with were just as difficult for them as they were for the Indian experts?—*A.* I don't consider that we can dispense with experts altogether as suggested but what I would point out is this. I do not think that any amount of tuition in a pioneer factory would really make a man an expert in the real sense. We could train him up to a certain point and afterwards he will have to work out his problems for himself. He must learn the thing by bitter practical experience. Then he will gain real confidence and become a good expert. I do not think it is right that a man who has been under a pioneer expert for two or three years should call himself an expert. I think he will have to work for four or five years longer on his own resources. He must begin in a subordinate position and then gradually rise to more responsible positions.

Q. Have you had any experience of State technical scholarships held in foreign countries?—*A.* I have seen some of the men who have returned from England.

Q. What is your experience of the kind of men so produced?—*A.* I have not been much impressed with the utility of the training that these students have been able to get in England.

Q. In what points do you think that the training is defective?—*A.* Mainly in business ability and secondly practical ability. They do not seem to have grasped the details.

Q. Do you think that they want factory or workshop experience?—*A.* Yes.

Q. Do you think it is desirable that they should get such experience while they are in England or should they acquire it after they return to India? In short do you want it before they go or after they return?—*A.* I would give it before they go. When they come back they must have their eyes open and they must grasp the chances as they come.

Q. You mean that no man should go as a State technical scholar without having had workshop or factory experience in a subject so far as India could give it?—*A.* That is my view.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* From your experience you think that you do not want a man to go abroad for training. Take for instance sugar. Don't you think that experts might be sent to Java to learn the system there?—*A.* I only say that in cases where the thing cannot be learnt locally one has to go to foreign countries.

Q. With regard to giving primary technical education do you think that the Government ought to establish workshops in connection with a technical institute or should they be worked separately?—*A.* As regards the training of men I have got my own view of the matter. What we have been doing in Mysore is this. We take the boys when they are 12 or 13 years of age. We keep him in school for three years and during the school period they are made to go through standard exercises. They are supervised very closely by the teachers and then they are also given a certain amount of elementary education discipline and drill and a few things like that. After they have been in that section for about three or three years and a half, then we send him to what we call the workshops section where they work along with men who are paid daily wages. The boys are also placed in a position to earn some wages. The amount of work turned out by them is valued and then they are paid accordingly by the Government. The superintendent of the school pays them. In that way we have been able to hasten the progress of the boy. But all the same even after the three or five years I do not consider a boy a fully trained journeyman. He has still to go through some period of apprenticeship in some of the bigger workshops. Our idea in teaching the boys in the school is that each boy will receive more individual attention and that the experience that the boy acquires in this way will fit him to grasp things much better later on. Whereas if we take away the boy soon, he is not able to grasp things easily as powers of assimilation have not been developed. I think that is what we have found here. By close attention and training and supervision we were able to train much better men.

Sir D. J. Tata.—*Q.* I understand that the Mysore State has given some scholarships to students for being trained for work in the various departments. How many of such scholars have come out?—*A.* I have not got the complete list with me.

Q. Roughly?—*A.* Very nearly about a couple of dozen.

Q. After they have returned have they found employment in the State?—*A.* Some of them have got in. Not many.

Q. What are those that have found employment doing?—*A.* They have found employment in the branch in which they have been trained.

Q. Does it happen that a man who has been trained in electrical engineering has been made an accountant?—*A.* I shall have to refer to statistics.

Q. You have sent some men to be trained in Electrical Works. Have they returned?—*A.* Yes.

Q. Are they all employed now? If so, what satisfaction are they giving?—*A.* They are giving good satisfaction.

Q. You are satisfied with them?—*A.* That is what I hear. I am not personally in touch with them.

Q. Have any of them been put in executive posts?—*A.* There is one for instance. He is a cheif operator in Sivasamudram. He is one of the local graduates sent to America for training. After receiving the training he served a period of probation for about five or six years. He is now in charge in Sivasamudram.

Q. Do you know how long he has been there?—*A.* Three years.

Sir F. H. Stewart.—*Q.* You refer to a technical institute and a mechanical engineering institute. Under whose control are they? Are they under the Department of Industries?—*A.* Under the Inspector-General of Education. But the Government have appointed a committee of which I am the President. We act as a sort of Advisory Committee to the Inspector-General of Education in the matter.

Q. I suppose he accepts your advice?—*A.* As a rule he does.

Q. How long has that institute been in existence?—*A.* For about nearly four years.

Q. And how long has the Department of Industries been in existence?—*A.* About four years.

Q. You then refer to a course at the Mechanical Engineering school. You say that the course is of three years and a half and that two years and a half are spent in some recognized school and that one year is spent outside in a recognized workshop or factory? Where does this one year come in?—*A.* At the end.

Q. You would attach great importance to practical training?—*A.* Yes.

Q. You suggest that Government should start a certain number of model schools for selected industries and that these schools should be laid out as so many miniature factories so that the training afforded may be as similar as possible to factory training? Don't you think that it is much better to have the man in an actual factory where he has to earn his wages?—*A.* That is what I mean that these schools should be organized as actual factories.

Q. If the man has to earn his wages in the factory he will take greater interest?—*A.* When I say model factory I only mean a factory that is started with the definite idea of giving instruction. I also said that it must be run on commercial lines so as to be a real working factory.

WITNESS SUBSEQUENTLY FORWARDED THE FOLLOWING.

Sanctioned scale of establishment of the Department of Industries and Commerce, Mysore, Bangalore.

Executive—

1 Director on Rs. 2,500.
2 Assistant Directors on Rs. 500—50—800.
3 Superintendents on Rs. 200 to Rs. 400 and 6 peons on Rs. 8 each.
3 Mechanical Engineers on Rs. 100—200 and 3 peons on Rs. 8 each.
2 Assistant Superintendents on Rs. 100 and 2 peons on Rs. 8 each.
6 Mechanics on Rs. 50—100.
6 Mechanics on Rs. 30—60.
3 Drivers on Rs. 25.

Office—

1 Manager on Rs. 150.
1 Shorthand typist on Rs. 75.
1 Draftsman on Rs. 80.
1 Statistical clerk on Rs. 50.
1 Accountant on Rs. 40.
1 Clerk on Rs. 30.
1 Record-keeper on Rs. 20.
1 Attender on Rs. 10.
1 Duffadar on Rs. 12.
1 Cycle orderly on Rs. 10.
4 Peons on Rs. 6 each.

Specialists—

1 Tile Expert on Rs. 450 and 2 peons on Rs. 8 each.
1 Soap Expert on Rs. 250.
1 Dyeing Expert on Rs. 100.
1 Button Expert on Rs. 100.
1 Textile Assistant on Rs. 200—25—300.

WITNESS No. 276.

MR. C. RANGANATHA RAO SAHIB, *Assistant Director of Industries, Mysore State.*

WRITTEN EVIDENCE.

I have been in close touch with the industrial work in the Mysore State for the past four years as Secretary to the Industries and Commerce Committee, and recently as Assistant Director of Industries and Commerce.

Capital.

I am a Director on behalf of the Mysore Government of the Mysore Cotton Seed Oil Company in the promotion of which I took a considerable amount of interest. The practicability of establishing this industry on a commercial basis in Mysore was favourably reported upon by the Director of Industries, and the Government promised to subscribe for one-sixth of the share capital. In spite of these inducements for subscription, it was exceedingly difficult to persuade the public to subscribe the share capital (three lakhs). On the other hand when the prospectus of the Mysore Bank was issued, the required capital of 10 lakhs was subscribed within a very short time. I was intimately connected with both these schemes and I found people were more willing to subscribe to the bank shares than for the shares of the cotton seed oil company, although it was well known that both the schemes were viewed sympathetically by Government. I am certain that for the promotion of new industries or industries with which the people are not familiar, it is exceedingly difficult to obtain private capital.

The operations of a bank are fairly well known and when the scheme for a bank was issued with some concessions from Government, the public lent their financial support very readily. In regard to the industrial scheme of cotton seed oil extraction with which the people are not familiar, the support of Government was not of much value. The people were inclined to suspect that Government knew nothing about it and their support was not considered sufficient evidence of the soundness of the proposed undertaking.

Pioneer factories.

I consider it essential that Government should recognise that the pioneering of industries is one of the most potent means of encouraging the industrial advancement of the country. The Government of Mysore have indicated the circumstances under which industries may be pioneered as follows:—

(1) The preliminary investigations conducted with a view to test the financial prospects of the industry should indicate, that *prima facie*, the industry can be established with success in Mysore.

(2) The industry should be such as would help in the utilisation and development of the natural resources of the State or to be likely to increase the wealth and well-being of the people.

(3) The financial position of the Government permits of such an experiment being tried without resort to borrowed funds for the purpose, and the magnitude of the operations is not so large as to cause embarrassment in case of failure.

I consider that these rules also hold good in the larger field of British India subject to the condition that Government should pioneer the industry only after it has been ascertained by inquiry or otherwise that no private capitalist or company is willing to do so.

Under present conditions in India, the industries that obtain the ready financial support of the Indian public are chiefly of two kinds:—

(1) Large industries the details of which are thoroughly standardised, started by companies with influential names on the directorate, such as a cotton mill.

In regard to these concerns their establishment and successful working is mainly a question of finance and business ability.

(2) Small industries in which the operations are more or less familiar, such as rice-hulling and cotton ginning. Capital is very readily available for industries that fall into this class, so that there are more gins at Davangere, the cotton growing centre of the State, and more rice mills at Mysore, than are necessary to deal with the raw cotton and paddy available at these places.

Industries such as the manufacture of paper from bamboo, destructive distillation of wood, or those concerned in the complete utilisation of the products from oil seeds, which should be started if the natural resources of the country should be fully developed, have no chance of obtaining public support unless pioneered by Government. It is owing to considerations of this nature that the Government of Mysore have decided to pioneer soap manufacture and button-making in the State.

The problems that new industries have to solve in order to successfully establish themselves in a market such as India, open to the whole world, are so varied that no matter how satisfactory any industry may appear on paper or however certain it may be that it may prove to be profitable *ultimately*, it is very doubtful if it will begin to pay from the start. I may give as an example the manufacture of matches. Experts have repeatedly asserted that the Indian forests can supply wood from which matches at least equal to the variety imported from Japan can be made, and yet no match-factory has yet been able to pay. The industry has been tried in various places for over twenty years without any satisfactory result.

I believe that a new industry must generally expect to meet with considerable difficulties before it has successfully adjusted itself to the Indian environment, and that it is certain that the results are not likely to come up to the financial expectations of the promoters even if there should be no actual losses due to miscalculations want of experience, and unforeseen circumstances, and I consider that such poor return or losses should be borne by Government in the interests of the general industrial development of the country.

Government assistance.

In regard to the methods of Government assistance, I consider that all the methods referred to in question 5 are suitable, the special manner in which any particular industry or business should be encouraged varying according to the circumstances of each case. They are the recognised methods of Government assistance in other countries and there is no reason why they should not be adopted in India. I shall deal with them briefly.

(1) & (2) *Money grants, bounties and subsidies.*—The Government of Mysore have promised to pay half the working expenses of the Mysore Bank not exceeding Rs. 10,000 per annum for five years and to deposit a sum of 5 lakhs per annum in the bank without interest for a period of 10 years. The total money value of the concessions to Government is about Rs. 2,25,000. It is certain that without this concession the bank would never have been established. But the benefits the bank has already conferred on the mercantile interests undoubtedly justify this expenditure of the tax-payer's money. The foreign trade of Mysore before the bank was established was mainly financed from capital obtained from outside the State and profits of this business was enjoyed by non-Mysorean capitalists. Within four years of its establishment the bank has placed 50 lakhs of local capital at the disposal of the mercantile community. Before the close of the period for which the concessions are granted I have no doubt that a large portion of the foreign trade, about 12 crores, will be financed by local capital.

(3) *Guaranteed dividends for a limited period.*—The guaranteeing of dividends was most successfully adopted by the Government of India for the extension of railways. Such a liability is in my opinion, justifiably incurred when private capital is required on a very large scale for works that are of permanent benefit to the country. The establishment of land banks to deal with the question of the permanent agricultural and industrial improvement of the country will only be possible if Government guarantee interest on the capital required. Both the Government of Egypt and that of Japan promoted the establishment of land banks by guaranteeing interest on the capital.

(4) *Loans with or without interest.*—The question of loans without interest has already been dealt with. Loans with interest should also be given. The loans granted by the Mysore Government in the nature of takavi, which I shall deal with later on, for industrial and agricultural improvement are granted at 6¼ per cent. About 2½ lakhs of rupees have been granted by Government since this scheme was inaugurated about three years ago.

(5) *Supply of machinery.*—Supply of machinery on the hire-purchase system is a well-recognised method of promoting the introduction of mechanical appliances. It has been adopted with advantage, I understand, in Hungary and Japan. It is largely resorted to in Mysore for the introduction of power-driven lift irrigation plants and for rice-hulling, sugarcane crushing, oil-milling, cotton-ginning, etc. The total value of the machinery installed under the hire-purchase scheme up to the end of 1915-16 is Rs. 1,06,796-4-0.*

(6) *Provision of part of the share capital.*—The Government of Mysore have subscribed about Rs. 50,000 which is equivalent to half the paid up capital, in the Mysore Tannery. If this assistance had not been given the tannery would have ceased to exist. The industry is doing very well now.

(7) *Guaranteed Government purchase.*—There is no doubt that the guaranteed purchase of products is one of the most important methods in which industries can be encouraged. Although witnesses are enjoined to confine themselves to their personal experience, the immense importance of the subject is my excuse for quoting the following extract from the "Royal Economic Journal" (March 1911) in regard to the results

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* See explanation in oral evidence.

which this method of assistance has brought about in Hungary. In Hungary, where home products of an "adequate" character are to hand, they must in all cases be given preference over foreign products. It is stated that of 27½ million crowns appropriated by the State authorities in one year for public contracts over 24 million crowns were paid for articles produced in Hungary. The writer concludes as follows:—

"The effect produced by the provision relating to public contracts may be "said to be a universal one. Numerous manufacturers and independent craftsmen have "the orders placed with them by the State and Municipal Authorities to thank for "securing work that enables them to thrive and prosper."

I consider there should be complete Government control wherever there is Government assistance. In return for the assistance promised by them to the bank, the Government of Mysore require among other things that the President of the Board of Directorate of the bank should be appointed with their approval, that the accounts of the bank should be audited by a person appointed by them and that the bank should "give due consideration to any advice that may be tendered by Government concerning the management of the business and employment and investment of the funds of the bank". It does not, of course, follow that this control should be exercised. So far as I know, Government have had no occasion to tender any advice to the bank under the last clause.

I consider that the factories pioneered by Government should be closed, as soon as it is established that the chances of their successful establishment are very remote. In regard to successful ventures they may be handed over to private enterprise as soon as it appears that private enterprise can develop the industry quite as successfully. It would probably be advisable for Government to retain a large measure of control to prevent the new industry meeting with undue competition and to provide such assistance in the matter of expert aid, financial support, as may be required to develop the industry fully.

Takavi rules in Mysore.

Before attempting to answer other questions, I shall briefly consider the rules in force in Mysore for the encouragement of the use of machinery for agricultural and industrial operations and the results achieved hitherto.

Loans of money may be granted under these rules for any of the following purposes:—

(i) Purchase and erection of machinery for agricultural and industrial undertakings, ordinarily up to a limit of Rs. 10,000 in each case.

(ii) The construction of wells and tanks, of mills, warehouses and other structures necessary for agricultural and industrial operations.

(iii) The provision of raw material, working capital or appliances, other than those specified above required for the carrying on of industrial operations, ordinarily up to a limit of Rs. 5,000 in each case.

Loans for the purchase of machinery are sanctioned only when the Director of Industries or other competent professional adviser considers the machinery selected as suitable for the purpose for which it is proposed to be applied. If requested by the borrower, the Department of Industries will undertake the erection of the work for which the loan is sanctioned and hand it over to him in good working order.

All loans carry interest of 6¼ per cent and are repayable in fixed annual instalments discharging both principal and interest. The time allowed for repayment is fixed by the Director of Industries and Commerce subject to the limitation of a period of 5 years in the case of loans for industrial purposes and seven years in the case of loans for agricultural purposes. The loans are recoverable as arrears of land revenue.

The most important provisions of these rules are those which relate to the scrutiny to which all applications are subjected. This scrutiny is of two kinds, namely, (1) that the interests of Government are protected, (2) that the party availing himself of the concessions offered by Government is not embarking upon an unsound scheme.

(1) The interests of Government are protected by the security of immoveable property that is required from every applicant. The property should be at least equivalent in value to the loan applied for and in cases where the loan is for more than Rs. 2,500 the property is valued by a special officer attached to the Department of Industries. There is no doubt that this special valuation by an experienced officer deputed for the purpose instead of the applications being forwarded to Revenue Officers for being dealt with in the usual course ensures a stricter examination of the security offered besides facilitating the disposal of the applications much more quickly. In the matter of loans for machinery Government interests are further protected by the fact that the machinery purchased is one that is readily saleable should it become necessary to realise the loan.

(2) The examination into the soundness of the scheme proposed by the borrower is ensured by the powers and responsibilities of the Director of Industries in regard to these loans. The borrower is entitled to the advice of the department free of charge even before he makes a formal application for loan. The application is made to the Director of Industries and the machinery is selected by this officer. The borrower is entitled to ask this officer to instal the plant for him and hand it over to him in working

[illegible] loan are made to this officer who is enabled in special cir[illegible] the borrower for favourable treatment by Government. [illegible] amounts under Rs. 2,500, the Director has powers to sanction e loan himself and when they are for amounts above this sum they are sanctioned her by the Chairman of the Industries and Commerce Committee or the Government, the case may be, who, however, rarely sanction any application unless it is supported the Director of Industries.

The rules relating to the hire-purchase agreement are practically similar except at no security of immoveable property is offered by the borrower, one-fourth of the alue of machinery being offered as an advance. The balance is furnished by Govrnment, the entire machinery being regarded as the property of Government until he loan is paid off. I enclose two copies * of the loan rules for perusal.

These rules were sanctioned in January 1913 and have been in force for four years. The total number of applications dealt with under these rules up to the end of December 1916 is 85 and the total amount sanctioned by Government is Rs. 2,58,723-12-0. The applications vary in amounts between Rs. 141-4-0 sanctioned under the hire-purchase scheme for workshop appliances and a sum of Rs. 22,000 to a co-operative society for installing a sugarcane crushing plant and a rice-huller.

The repayments towards loans up to the end of the official year 1915-16 were Rs. 38,945-10-0 towards principal and Rs. 5,208-4-11 towards interest and the arrears due were Rs. 5,082-8-0.

The industries which have either been set up or developed with the aid of loans obtained from the Department are of varied character. They include (1) pumping installations, (2) sugar plants, (3) rice-hullers, (4) oil mills, (5) printing presses, (6) saw mills, (7) grinding mills, (8) silk twisting mills, (9) flour mills, (10) hosiery factory, etc.

In regard to the advantages that the borrowers have obtained from them there is some difficulty in obtaining accurate information as the applicants are naturally unwilling to permit their private accounts to be inspected. There is however, no doubt that except in regard to cases to which allusion will presently be made, a large majority have yielded good profits to their promoters. I will mention a few instances. An Anderson Oil Expeller plant was set up for Mr. Muniappa in Bangalore by the Department in 1914 with a loan of Rs. 10,000 sanctioned by Government. In a single year between 15th September 1914 and 18th September 1915, 12,000 bags of honge seeds were crushed by him yielding 260 tons of oil and 664 tons of cake. The cost of the seeds was Rs. 58,753 and the oil and cake were sold for Rs. 80,818. The working expenses were (1) electric energy Rs. 1,673, (2) wages and workmen Rs. 1,035 and (3) firewood and oil Rs. 940 making the total out of pocket expenses Rs. 62,401 leaving a gross profit of Rs. 18,417. Assuming that Rs. 6,000 should be deducted for office expenses, pay of manager, depreciation and repairs, Mr. Muniyappa realized a net profit of Rs. 12,000 equivalent to about 40 per cent on a capital outlay of Rs. 30,000. During the year 1916, Mr. Muniyappa paid Rs. 84,000 for honge seeds and realized Rs. 1,15,000 by sale of oil and cake. His working expenses amounted to Rs. 5,886, leaving a gross profit of over Rs. 25,000.

The co-operative society at Bannur which was just referred to as having obtained a loan of Rs. 22.000 for a jaggery boiling plant and a rice-huller is conducting its business under the general direction of the Department of Industries and Commerce and its accounts are available for inspection. Work was first started by hulling paddy in December 1915 and up to the end of December last year, 4,218 candies of paddy were hulled by the society. Jaggery boiling was commenced in November 1916 and by the end of the year 1,135 maunds of jaggery had been made. The total income realized by the society was Rs. 4,528-4-0 and the total working expenses on wages fuel, etc., were Rs. 2,405-15-0 leaving a gross profit of Rs. 2,122-5-0.

A very typical instance is that of Mr. Basappa of Hunswadi village, Shimoga district, who has set up a pumping installation and sugarcane crushing mill at the advice of the Department with his own capital. His pumping plant commands about 50 acres of land about a third of which was hitherto obtaining a precarious supply of water from a tank and was yielding a poor paddy crop. His lands are situated on the banks of the Thunga river and the pumping plant has done away with all difficulties in regard to water-supply. The entire installation including the sugar mill has cost him Rs. 7,500 and he has spent another sum of Rs. 6,000 in constructing a small distributing channel and in preparing his lands. He has practically realized no return on all this outlay as yet but he has grown a splendid sugarcane crop on 22 acres of his land during this year and expects to realise a gross return of about Rs. 9,000 from it.

One other instance of the results obtained from a sugar mill set up by the co-operative society at Sabbenahalli, Kolar district, may be mentioned. Sugarcane crushing was started at Sabbenahalli on the 4th February 1915 and by the 19th March all the cane available in the locality was crushed yielding 4,324 maunds. The cost of the plant was Rs. [illegible]. The working expenses were Rs. 751 as against Rs. 1,391 which

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* Not printed.

represented the total milling charges received. Very satisfactory jaggery was produced, the yield from the power mill being estimated to be 10 per cent in excess of that obtained from the ordinary mill driven by bullock power. I quote below the following extract in regard to the working of this mill from the annual report of the Kolar District Committee submitted to the Mysore Economic Conference last year.

" Mr. Lakshmana Reddi, Patel of Sabbenahalli, who is also the President of that
" co-operative society, reports that 4,324 maunds of jaggery were prepared, there was
" a saving of Rs. 600 in the working charges and a profit of Rs. 1,150 for 3,324 maunds
" sold, over and above what could have been got from the country crushing mill and
" 1,000 maunds of jaggery are still remaining with him, without being sold, as the
" market for jaggery has gone down. He adds that the people of those parts are
" satisfied that the concern is a profitable one.

" The cost of this installation was about Rs. 13,000 the Government advancing
" Rs. 12,000. This is the first installation started on co-operative lines in India, as
" Mr. Chatterton was pleased to remark on the opening day. Every praise is due to
" Mr. Lakshmana Reddi for being the pioneer of such an undertaking in this district."

I have alluded above to some cases of failure which have undoubtedly occurred. I hope I may preface my remarks on this head by alluding to a circumstance in which I took some action. Mr. Muniyappa who set up his Anderson Oil Expeller in July 1914 began business by crushing ground-nut and was exceedingly pleased with the work his plant turned out. He soon turned his attention to honge seed which his machine also crushed quite satisfactorily. Although Mr. Muniyappa was himself quite satisfied it appeared to the Director of Industries that Mr. Muniappa did not make any profits owing to his being in chronic need of money. The Director requested me to audit Mr. Muniyappa's accounts. I found that for the three months Mr. Muniappa had worked his plant he had lost over Rs. 1,000 owing to the fall in the price of ground-nut and also owing to his not working the plant up to its full capacity. He was working the mill for about 8 hours a day and his working charges were excessively heavy. I found that with a very moderate increase in his working expenses he could work the mill for 24 hours and realize a handsome profit. Mr. Muniyappa was not slow to recognize this advantage and began to work his mill from 20 to 24 hours a day with the result that he earned something like 40 per cent on his capital outlay within a year.

The installation of industrial machinery does not automatically result in handsome profits. The leisurely habits of doing business, which did not matter when production was on a small scale, become dangerous directly machinery is installed. To work industrial machinery to their full capacity, a greater working capital and a larger supply of labour will be required. Even if a revolution in one's business habits is soon effected the other requirements for working machinery successfully are difficult to come by. To cite Mr. Muniappa's case once again no one would advance him money to enable him to expand his business. The Mysore Bank was suspicious of this venture and would not help him. As I knew that the business was perfectly sound, I obtained the necessary accommodation from a friendly capitalist.

In a few instances, the installation of machinery has not been financially successful —there has been no case in which the plant has failed to carry out the work it was set up to perform—because for various reasons the machinery has not been worked to its full capacity. Again in some pumping installations, the parties seem to have thought that all they had to do was to obtain water and everything would go on alright. They never apparently realized that money had to be expended on the construction of distributary channels, preparation of land, manure for intensive cultivation, etc. In several cases where all this had not been foreseen there has been great loss.

There is, however, no doubt that these rules have conferred a great benefit on the country. They have promoted the establishment of a number of mechanical plants in a variety of industrial processes and familiarized the people all over the State with the advantages of using machinery. They have stimulated the use of private capital in industrial adventures, for instances have not been wanting where private capital has been promptly employed in an undertaking which an enterprising man had proved to be successful with capital borrowed from Government. There are now about 110 installations set up either with borrowed capital or private resources in different parts of the State and every one of them is a centre of industrial and business knowledge to the people living in the neighbourhood.

A multiplication of such mechanical plants studded across the whole country, dealing more especially with industrial processes in which increase in number of plants does not mean decrease in profits, such as, pumping plants, sugar mills, will, I feel sure, promote the material well-being of the country and create a real industrial atmosphere.

It is, of course, not necessary that the mechanical plants for which Government assistance should be given should always be small or that they should be employed in undertakings of such a non-competitive character as a pumping installation. If it is one that expert investigation shows has a very good chance of success it should be possible to obtain aid from Government towards its establishment.

Director of Industries.

To make it possible to establish industries, large and small, with Government aid, will obviously require a great deal more than the introduction of these takavi rules into India. The rules should be administered by a sympathetic Director of Industries with ample powers who is either assisted by a staff of experts or who can apply to some technical body in India for expert advice. I may at once state that the Director of Industries should be primarily a business man with organising capacity, and preferably a mechanical engineer as industrial development in India largely means the introduction of power-driven machinery.

Demonstration factories.

The sugarcane crushing mills started by Government afford very good evidence of the useful purpose served by demonstration factories. Crushing cane by means of motive power had been attempted before the Department of Industries took up the question Except in one case where the fuel resources of the sugarcane grower were ample, and all the juice extracted by working the machinery to its full capacity was capable of being dealt with without any increase in out-of-pocket expenses, power-milling had failed to cheapen the cost of production. The department devised a furnace to burn the sugarcane trash so as to do away with the necessity for wood fuel altogether and also incidentally limited the number of labourers required to be employed in jaggery boiling. This system of boiling juice in tiers of open pans placed over suitably constructed flues has been described in a bulletin (Bulletin No. 55) published by the Agricultural Research Institute, Pusa, and it is only necessary to briefly indicate the results achieved.

(1) Jaggery manufacture.

The new sugar installations of which four have until now been erected in different parts of the State by Government met at first with considerable opposition partly occasioned by the inexperience of the subordinates of the Department in the manufacture of jaggery. The advantages of this system of manufacture has generally been realized and the opposition has largely died down. One of the Government installations has been purchased by a private individual and three private installations have been set up apart from the two plants erected by co-operative societies to which reference has already been made.

The installation can be set up at a cost of Rs. 12,000 and will deal with about 100 acres of cane in a season. With the aid of the takavi rules in force the capital required is easily obtainable by private individuals or co-operative societies and under the system of sugarcane cultivation generally practised in the State a large number of places will be available where such installations can be profitably set up.

The mills yield about 10 per cent more juice than that obtainable in bullock driven mills and the working expenses are low. They amount to about 4 annas per maund (25 lb.) of jaggery made when the total quantity dealt with a season is only 12,000 maunds. As the mills are capable of producing at least 50 per cent more jaggery the working expenses can be reduced much further.

There is, however, one difficulty in regard to their installation which has not yet been completely surmounted. The organization necessary to keep the mills at work to their full capacity is very difficult to create. With a view to surmount this difficulty it has been considered advisable to lease one of the Government mills this year to a private individual free of cost for one season so that he may be suitably compensated for taking measures with a view to maintain a steady supply of cane to the mill. There is no doubt that co-operative societies are qualified to solve this difficulty and the multiplication of sugarcane crushing plants will largely rest with them in future.

(2) Weaving factory.

The Government Weaving Factory is another instance of good work done by demonstration factories. The factory contains 36 looms of which seven are fitted with jacquard harness. The cloths turned out are varied of character and meet with a ready sale. The value of the outturn per month is about Rs. 2,000. Besides the factory proper in which cloths for sale are made, there are sections devoted to experimental and demonstration work. A loom for weaving cloths with solid borders and a sectional wrapping and sizing machine have been devised in the experimental section. Over 1,000 fly-shuttle slays have been set up by the demonstrators in the districts. Fly-shuttle weaving has been largely popularized in the State owing to the efforts of the officials of the factory. The work turned out here is of very superior quality and there is no doubt that considerable profits might be made if the number of looms at work is increased. Experiments in regard to the advantages of introducing power looms driven by electric motors in weavers' houses were made but no action has hitherto been possible owing to the difficulty of getting machinery. In the same manner a superior quality of blankets were made with local wool at the factory with the aid of the Bangalore mills but unfortunately all action in regard to the development of the woollen industry has had to be suspended owing to the war.

Official organisation.

I am of opinion that it is advisable to have an Imperial Director of Industries for all India. It is necessary to appoint such an officer to co-ordinate the activities towards industrial improvement in the different provinces. This officer should be assisted by a staff of experts and should have power to decide the industries for which Government aid will be given in the different provinces. A sufficient sum of money should be set apart every year for the promotion of industrial enterprise. The Imperial Director assisted by a Board of business-men and non-official representatives should have power to decide on the expenditure of this sum.

This money should be available for undertaking pioneer industrial enterprises and for grants to local Governments for carrying on similar work. The members of the Board may be nominated once in three years but the Board should have powers during the time they have authority similar to the Board of Directors of a joint stock company in regard to the management of the undertakings started with Government funds. The Imperial Director should be the Chairman of the Board.

Beyond indicating the industries that should be investigated in the different provinces and exercising supervision over the industries started with the aid of Imperial funds, the Imperial Director should have no authority over the Provincial Directors of Industries. The staff of experts under the employment of the Government of India should be lent for service to local Governments and should be subordinate during such service to the Provincial Director of Industries. The Provincial Director should also have a local Board constituted similar to the Imperial Board.

mitations of kavi Rules in dustrial development.

I am of opinion that with the safeguards provided in the takavi rules as they are in force in Mysore it is quite possible for the Presidency Banks to make loans under them. If the industrial development of the country should take place unhindered the business under them should develop largely and it is advisable that it should be handed over to a bank. The Mysore Bank already has, I believe, intimated its willingness to take over this business from Government.

There is, it seems to me, one difficulty which prevents the large extension of the takavi rules. The rules require the security of immovable property and the security uniformly required is land, that is burdened with no prior liability.

It has however been frequently found that a majority of the best lands in a village are under a mortgage liability and this liability is generally on the increase. As explained in the note * on a land bank for Mysore forwarded herewith, I find that the mortgage liability doubles itself once in fifteen years in Mysore. During the year 1881-82 the value of the mortgages effected was Rs. 24,72,000. In 1896-97 it rose to Rs. 69,26,000 and 1914-15 it was Rs. 1,05,34,000. The total agricultural debt in Mysore is about 7½ crores and the annual burden in the shape of interest is not less than 1½ crores. In 1893, Sir Frederick Nicholson estimated that the agricultural debt of the Madras Presidency was about 45 crores and the annual interest burden about 9 crores. The debt was regarded as equivalent in amount to 75 per cent of the value of the entire agricultural crop in a year and the annual interest about 15 per cent. The mobilization of the capital represented by land for industrial enterprise that it is the object of the takavi rules to assist will not be completely successful unless the problem of agricultural indebtedness is tackled in some way.

I am of opinion that a land bank is the only real ultimate solution. A land bank may be organised which will not only lend money with adequate safeguards to relieve agricultural indebtedness but will also promote agricultural and industrial development. The work done in this direction by the Central Hypothec Bank and the District Agricultural Banks in Japan seems to show that some similar organization can be established in India. It seems to me that with a guarantee of 5 or 6 per cent from Government sufficient capital can be raised for a land and industrial bank which should be worked in close conjunction with the Presidency Banks. I therefore venture to submit a copy * of my printed pamphlet on the Establishment of a Land Mortgage Bank in Mysore together with a typed note * embodying my replies to some friendly criticisms I received on the pamphlet. I need hardly point out that the draft scheme for Mysore in the last pages of the pamphlet does not apply to British India.

Before concluding my evidence, I wish to correct a possible misapprehension on this subject. Although my experience in regard to industrial matters has been entirely obtained from my association with work carried on under the orders of the Mysore Government and frequent references are made to this work, no one except myself is responsible for the views expressed in this note.

ORAL EVIDENCE, 14TH FEBRUARY 1917.

Mr. C. E. Low.—*Q.* With reference to your remarks about the Mysore Bank, you say that the bank has placed fifty lakhs of rupees of local capital at the disposal of the mercantile community. Has that money been obtained as deposits or as capital?—*A.* It includes both deposits and capital. The paid-up capital is ten lakhs, and the balance forms the deposits.

Q. Are these long term or short term deposits?—*A.* I do not know.

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* Not printed.

Q. What is the rate of interest on fixed deposits?—*A.* It varies between four and five per cent. On current deposits it is two per cent, and on fixed deposits it is four to five per cent.

Q. Does the Bank of Madras get much in the way of deposits from Mysore? There is a local branch here?—*A.* Yes.

Q. Do they get much in the way of deposits from the State?—*A.* Yes. The State was depositing in the Madras Bank.

Q. I mean from the Mysore people?—*A.* Not as much as the Mysore Bank has now got.

Q. To what do you attribute the Mysore Bank's getting more money than the Bank of Madras?—*A.* There are Mysorean directors on the bank, and there is the knowledge on the part of the people that the bank is under the guidance and supervision of the Mysore Government. It is now four years since the bank was established.

Q. On what security does the bank lend? Does it lend on estate or immovable property?—*A.* It cannot lend on immovable property. It is practically worked on the same lines as the Presidency Banks.

Q. What class of trade does it usually lend to?—*A.* Commerce chiefly.

Q. Does it lend anything to manufacturers?—*A.* Very little I should think. I know one or two instances in which it refused to lend, and I have made a note of them in my written evidence.

Q. Does it lend working capital?—*A.* It does in some cases.

Q. To small oil mill people or select people?—*A.* It does lend when the business is fairly well established and the borrower is fairly well known.

Q. Is there any agent to advise the bank as to whether an industrial concern is run on sound lines and is a safe object to finance?—*A.* No.

Q. It does not use the State Department of Industries for that purpose?—*A.* I know the present manager did sometimes consult the Director of Industries, but that was quite in an informal way. There is no formal arrangement.

Q. Does it lend to co-operative credit societies?—*A.* Yes, to the Co-operative Central Bank.

Q. Does it lend on pledge of jewellery and that sort of thing?—*A.* I think it does. I do not know much about the details of the working of the bank. I had something to do only with its starting.

Mr. A. Chatterton.—*Q.* The Mysore Bank is run exactly on the same lines as the Madras Bank?—*A.* Yes.

Mr. C. E. Low.—*Q.* You speak of the supply of machinery on hire-purchase system. You say that the total value of the machinery installed under the hire-purchase scheme up to the end of 1915-16 is Rs. 1,06,796-4-0?—*A.* That is not the total value of the machinery installed. It is a mistake. It is the total value of the money advanced.

Q. The money advanced under the hire-purchase system?—*A.* That is one-fourth of the value of the machinery. The Government advances one-fourth and the balance is furnished by the borrower and the machinery is installed, and the whole machinery is regarded as a security until the loan is paid off.

Q. The applicant deposits with the application one-fourth of the value of the machinery required, and he obtains the machinery on hire-purchase system. How long has that been going on?—*A.* Four years.

Q. Have you large arrears outstanding?—*A.* We had Rs. 5,000 arrears at the end of last year. The total amount recoverable was about Rs. 48,000 and we recovered about Rs. 43,000. It includes both the hire-purchase money as well as the arrears of loans.

Q. How do you manage about the depreciation of the article? In how many years do you insist on such loans being repaid?—*A.* It is five years in the case of industrial machinery and seven years in the case of agricultural machinery.

Q. Have you had many cases in which the plant has failed to work properly owing to the fault of the borrower? He might have neglected it?—*A.* I know of no instances where the plant has not done the work that it was set up to do. I know of some instances where the man has not used the machine or has not properly benefited by it.

Q. Do you have to sell the plant in many cases?—*A.* We have never yet had a single occasion to sell. On occasions the Director had only to send a man to remove the machinery and the money was at once paid up.

Mr. A. Chatterton.—*Q.* You have got a bailiff?—*A.* Yes, and the money is paid to him when he goes for collection.

Mr. C. E. Low.—*Q.* You give us the conditions under which the loan may be granted, that is, "Purchase and erection of machinery for agricultural and industrial undertakings, ordinarily up to a limit of Rs. 10,000 in each case. The construction of wells and tanks, of mills, warehouses and other structures necessary for agricultural and industrial operations." Do you observe much difference in practice between a mill building and machinery?—*A.* I may at once state that practically all loans are under the first clause.

Q. And the ordinary limit is Rs. 10,000?—*A*. Yes. But in several cases it has been exceeded.

Q. How did the Mysore Government find that money financially? Do they have a separate head?—*A*. Yes. They have budgeted for it. So much as the Director may want is reserved in the ordinary Government budget for loans.

Q. Do they credit that head with the recoveries?—*A*. Yes.

Q. That is kept as a separate head?—*A*. Yes. It is kept as an open account.

Q. Is it your experience that the grant of loans by giving machinery on hire-purchase system discourages the independent enterprise of other capitalists?—*A*. No.

Q. Do people start enterprises of their own accord without Government money as freely as when the Government money is available?—*A*. What they generally do is, they apply to the Government for machinery and reserve all the capital they have for working it.

Q. Do people who can start an installation on their own accord always go for Government help?—*A*. I know several instances where people have refused to go to Government because they did not wish to be in debt to Government.

Q. Because they wished themselves to show their own wealth and independence?—*A*. Yes.

Q. It is a sense of a little pride?—*A*. I should call it self-respect.

Q. Do you think in such cases the concerns which the people start with their own money are more numerous or less numerous?—*A*. They are less numerous because the richer people are less numerous.

Q. Do these people who start concerns with their own money obtain the assistance of the Industrial Department?—*A*. Yes. Quite as readily.

Q. How far do you think that a successful installation under the advice of the Industrial Department acts as an advertisement of the working of the Industrial Department in the immediate neighbourhood?—*A*. It is one of the most important advertisements. It has made the Industrial Department popular. Formerly it was always looked on with suspicion.

Q. If you have a successful plant in one particular place, that would lead to other of a similar kind to spring up in the neighbourhood?—*A*. Yes. That is very frequent.

Q. How is the mechanical staff—the technical staff—recruited, organised and controlled?—*A*. It is practically controlled by the Director of Industries. He gets applications, and tests the applicants and trains them.

Q. Where does he train them?—*A*. There has been no college hitherto. When the department was started two or three officers of the Public Works Department were transferred and the Director trained them for his work and got other people as he went along. The first two officers were sent to Madras and they saw a number of installations set up there, that is, relating to the pumping and boring department. They gathered experience in their work and began to do work here.

Q. And these new officers were put under the older officers and sometimes under the Director?—*A*. The Director used to get some of the officers transferred under him.

Q. The Industrial Department have some experimental presses and factories and other things which they are running. How far are they used as a means of training officers for the Department?—*A*. They are used as a means of training. In regard to the weaving factory that we have got here, we get weavers from the mufassal and they are trained here and sent out as demonstrators to the villages.

Q. For instance, you have a number of chemists attached to the Sandalwood Oil Factory who are learning practical work in the Factory. Is a similar policy followed wherever there is any plant and so on in which people can be taught?—*A*. Yes.

Q. I also observed yesterday morning that a student of the School of Mechanical Engineering was working there on the sugar installation under the guidance of a senior of his department?—*A*. Yes.

Q. When a man wants an installation, at a cost of about Rs. 10,000 to Rs. 12,000 he wants a responsible mechanic, at any rate, to run it for him, and you, I understand, always undertake to get him one. How do you provide that man?—*A*. We want temporary drivers and mechanics for installations, and we set up the installation, and generally these men remain with the person for whom the installation is set up. Sometimes the owner of the installation gets some of his own men trained during erection. In some cases there are students of the mechanical engineering school and they take them.

Q. You practically train them in the process of erection?—*A*. Yes. In the working of the factory they are trained in another place where the work is more advanced.

Q. You speak of the sugar mill set up at Sabbanahalli, and you say that the cost of the plant was Rs. 12,356 and the working expenses were Rs. 751 as against Rs. 1,391 which represented the total milling charges received. That means that the total of the earnings of the first season was only five per cent against which you have to set off depreciation and interest?—*A*. That does not mean that. The increase in the yield of aggery is not noted at all.

Q. That is for the benefit of the individual members?—*A*. The installation is for he benefit of the individual members.

Q. It might matter to the solvency of the society?—*A.* Yes.

Q. The cost of the installation, you say, was Rs. 12,356. In what instalments were they repaying it?—*A.* Seven years.

Q. They have got to repay something like Rs. 2,000 and interest?—*A.* Yes.

Q. But they have only made Rs. 600 and odd?—*A.* But that was the first year. That installation actually worked for forty-five days. We lost in the first year half the season.

Q. Can you say how far a co-operative society can induce the individual growers to bring their cane along in a proper order so as to ensure continuous working?—*A.* I think they could do that.

Q. You realise that it might mean a certain amount of loss to the individual man who may have to bring his cane away?—*A.* Not at all. The cane can generally stand for about a month so that there is no real loss.

Q. In all big mills there is always found to be a little loss, but that is made up for by the convenience of continuous working?—*A.* Here it stands sometimes eighteen months on the ground.

Mr. A. Chatterton.—*Q.* What is the procedure that is adopted in the department when a man comes to the Director and says that he wants a loan to instal an engine and pump?—*A.* The rules are explained to him and he is asked to intimate his wants. An officer is sent to the place and an estimate is prepared, and if the Director is satisfied that the man is likely to make money on it, a recommendation is made to Government and the loan is sanctioned.

Q. What about the enquiry as to the nature of the security?—*A.* A special officer is sent to the place. He is a revenue officer attached to the Department of Industries and he submits a report in regard to the satisfactory nature of the security offered.

Q. And does he reject many cases?—*A.* A number of cases are rejected.

Mr. C. E. Low.—*Q.* Does that revenue officer also help in the recovery?—*A.* No. There is no revenue officer attached to the Department of Industries for such work. The appointment of Assistant Director is quite recent, not more than three or four months old.

Mr. A. Chatterton.—*Q.* The takavi loans are granted either by the Director or by the Government?—*A.* Yes.

Q. Is the loan paid to the individual to whom it is sanctioned?—*A.* No. It is drawn by the Director and it is at the disposal of the Director. The Director spends the money on behalf of the individual. Generally, the Director erects the installation himself and furnishes an account of the expenditure of the money to the individual and obtains a receipt from him at the time of handing over the completed installation.

Q. Is that compulsory?—*A.* That is not compulsory, but it is usually done.

Q. As regards the recovery of loans afterwards, that is entirely in the hands of the Director?—*A.* Yes.

Q. And so far, has there been any great difficulty in dealing with the question of recovery?—*A.* No.

Q. The loan is granted by the department, and we have a certain policy as to when the man should pay and the number of instalments?—*A.* It is fixed with reference to the income that he is likely to get, so that he may pay it from the profits.

Q. Supposing a man is granted a loan to set up a pumping installation for sugar cane, when would be the first instalment?—*A.* Fifteen months after the plant is handed over to him—to give him time to realise a profit from the installation that he has put down.

Q. How does it differ from the policy which is pursued by private firms?—*A.* They do not wait at all.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q.* How are your co-operative societies managed?—*A.* There is a Registrar of Co-operative Societies.

Q. What is the constitution of your Board of Industries?—*A.* There is a Committee of Industries and Commerce. There is the Mysore Economic Conference. It is a body consisting of officials and non-officials. The President of the Economic Conference is the Dewan and several heads of departments and non-official representatives are on the Conference. The Conference is divided into three sections. There is one section devoted to industries and commerce and the President of that section is generally a member of the Government. The Director of Industries is a member of that body. I was the Secretary of that body for some time. If any application comes, it goes to the Director of Industries always, and he is empowered to sanction all loans up to Rs. 2,500, and beyond that amount, it goes up with the recommendation of the Director to the Chairman of the Committee who is empowered to sanction loans between Rs. 2,500 and 5,000. If the loan is above Rs. 5,000 it goes up to Government.

Q. If the Director of Industries is not inclined to give the loan, nobody can have a chance?—*A.* He has a chance and he can apply to the Committee.

Q. Can the Committee consider the matter?—*A.* It can call for a report from the Director of Industries.

Q. Can the Director of Industries give an advance up to the limit of Rs. 2,500?—*A*. Yes.

Q. In the matter of sugar plants, who are the people who take advantage of these advances?—*A*. The sugarcane growers.

Q. People who have no cash money but lands?—*A*. Yes.

Q. These few people join together and start?—*A*. Yes.

Q. Suppose the Director of Industries gets the machinery and instals it and it works satisfactorily, to whom does he hand it over?—*A*. To that society.

Q. In actually arranging who should manage the thing?—*A*. He arranges everything for them.

Q. Supposing all subscribe equally?—*A*. There is the President of the co-operative society, or whoever is the executive officer of the society. Till then it is entirely under the control of the Director of Industries.

Q. He keeps his man?—*A*. Yes. He has got the technical control of the factory.

Q. Has he any other experts to advise him as regards big concerns?—*A*. The Committee sometimes appoints experts. The report of the expert is forwarded to the Committee through the Director of Industries.

Q. If you advance money to a sugar factory, it takes a long time for it to be in running order, then when will the money be paid back?—*A*. The first instalment will be fifteen months after the work of the factory is started.

Mr. A. Chatterton.—*Q*. When an agreement is made or loan is granted on hire-purchase system, we put in the agreement a certain date on which the repayment of the loan would begin?—*A*. That is calculated on the assumption that you take so many months to erect the factory and there would be so many months for the crops to mature afterwards, and very often owing to various causes, for instance, especially since the war began, it has not been possible to get the factories erected in time. Then we alter the agreement and we give a further allowance of time. The Government gets no interest on the loan till the machinery begins to work. That will account for the fact that the amount of interest earned is comparatively small.

Hon'ble Sir Fazulbhoy Currimbhoy.—*Q*. Is the money advanced by the Mysore Bank?—*A*. By the Government direct.

Q. You say that there should be complete Government control wherever there is Government assistance. Is not the constitution of the Mysore Bank quite different from the Presidency Banks?—*A*. The constitution is quite different, but the method of working is entirely same. Although Government have power to control the bank and give the bank any advice they choose, they never interfere with the working of the bank. If they like they have power.

Sir F. H. Stewart.—One can assume that that system works very satisfactorily in Mysore. But can it be applied to India generally, to the different provinces of India?—*A*. I do not see why it should not be. If it is successful in Mysore, why should it not be successful in other parts of India.

Mr. C. E. Low.—*Q*. What is the average size of a tenant's holding in Mysore?—*A*. Eight acres, but it varies very much. If it is wet land it is two or three acres, and if dry, it may be 25 to 30 acres.

Q. Do you have zamindari tenure?—*A*. All ryotwari.

Q. How big are the ryots who take up these loans?—*A*. The revenue they pay may vary between Rs. 50 and 200.

Q. How many districts are there in Mysore?—*A*. Eight.

Q. And they are as big as the British India districts?—*A*. No. I suppose two of our districts would average one British India district (Madras district). Mysore is 30,000 square miles in area.

Q. Do you think that one revenue officer could make enquiries for the department all over the British Province, or do you think that it would be better to have it done through the local district revenue authorities?—*A*. I should always think that it is very much better to have one revenue officer or several revenue officers attached to the department. I think it is wrong to refer applications to the local revenue officers for enquiry.

Q. Your departmental revenue officer gets the assistance of the local revenue officers?—*A*. Yes.

Q. In finding out what the status of the man is, whether he really holds the land or not, your record of rights is presumably no better than that in Madras?—*A*. No, but the local revenue officer has enough experience.

Mr. A. Chatterton.—*Q*. One advantage of having a special revenue officer attached to the department is that he accumulates a certain amount of experience not only as regards titles, but also in regard to the men that are going to take up this work?—*A*. Yes.

[illegible] although the security may be good the man is not to be [illegible] or there may be something against him. He acquires experi[illegible] which is of extreme value to him?—*A*. These takavi rules require [illegible] officer should be specially attached to the Department of Industries.

Sir F. H. Stewart.—*Q*. My enquiry is far more general. Here you have got a very [illegible] Department of Industries, closely controlled and adequately staffed?—[illegible] is not adequately staffed.

Q. There is another point. You say that loans under the takavi rules may be made by the Presidency Banks and you say that the matter has already been taken up by the Mysore Bank?—*A*. The Mysore Bank has approached the Government to give them that right.

Mr. A. Chatterton.—*Q*. I have consulted Mr. Hunter about it and he is of opinion that under the Presidency Banks Act they are not able to take up such takavi loans directly. In Mysore we have not yet exercised the right of calling upon the Government to recover the loans as arrears of land revenue. We find that the ordinary method of collecting the loans has been hitherto sufficient?—*A*. In most cases the usual procedure is to send a written notice to the man and a large percentage is collected in that way.

Mr. C. E. Low.—*Q*. After a certain amount of experience in the collection of land revenue in India, the number of cases in which we have to employ the procedure permitted by the Land Revenue Act is very small. Do you think that it is desirable, if takavi loans are given out, that Government should have authority to recover them as arrears of land revenue,—if Government gives the loan?—*A*. It is right that the Government should have power.

Q. If the bank gives the loans on behalf of Government, they can easily say that, unless the means of collection are adequate and collections themselves are satisfactory, the rate of interest they would charge would be very much higher. Do you think that under those circumstances it is desirable that the bank should have the power of going to Government and asking them to regard these as arrears of land revenue?—*A*. I do not think so. It would not be at all necessary that the bank should be given that power. The bank would be able to recover the money without that power.

Hon'ble Sir R. N. Mookerjee.—*Q*. What were you before you became Assistant Director of Industries?—*A*. I was Secretary to the Industries and Commerce Committee for four years and before that a revenue officer. I have been throughout in the service of the State.

Q. Has the Mysore Department of Industries a budget of its own?—*A*. Yes.

WITNESS No. 277.

MR. WASHINGTON MARI, *Director of Sericulture, Mysore.*

WRITTEN EVIDENCE.

Technical and Scientific Departments.

Q. 64.—A good organisation is no less essential to the success of an enterprise than careful execution. The introduction of better and more hygienic methods in Indian sericulture is an enterprise of great importance and difficulty on account of the extent of the country and the diversity of conditions over which the operations have to be carried on. It is necessary therefore that there should be a central agency which can control and connect these operations so as to bring them into conformity with a general and well considered scheme.

I am of opinion that the constitution of a special department for sericulture would greatly help the rapid and systematic progress of the industry where favourable conditions exist.

It may perhaps be said that the main causes for the decline of sericulture are already sufficiently known, and that an elaborate programme of investigation directed to that end would probably be unnecessary. But the department will have to eradicate the causes of past failure by educating people out of faulty practices sanctified by tradition, and persuade them to adopt modern methods with up-to-date appliances.

The quality of raw silk produced will have to be rendered mercantile by the employment of suitable machinery so as to avoid wastage of silk in reeling, and to enable Indian silk to gain sooner or later its place in the world's market. Besides that the employment of a yarn of uniform denier would render possible a greater [illegible] in the manufacture of local fabrics.

[illegible] of the most important problems of the department would, in my opinion, [illegible] by careful experiments if breeds of silk-worm other than the local ones [illegible] places be recommended as more advantageous. There seems to be a mass [illegible] on the subject, probably the result of experiments conducted under [illegible] to complete control. There is an unhealthy tendency to shun [illegible] a subject which has to be approached with a frank spirit and

Q. 65.—I enclose a copy * of my scheme of organization of sericultural work in Mysore in the hope that it may be found to contain suggestions of a general nature, which may be useful in preparing a scheme for other parts of India.

Q. 110.—As a complement to the scheme I send—

(1) Plans prepared by me for :—
  (*a*) Rearing Schools and Rearing Houses,
  (*b*) Stands and Trays.
(2) Forms for collecting statistics.
(3) A booklet of photographic pictures illustrating the difference between the traditional practices and the methods recommended by the department.

llection of tistics.

It has been said that statistics are useful for forming a correct view based on facts as to what has happened in the past for affording material for estimates of the present and for rendering possible a forecast for the near future.

The absence of reliable statistics of silk production in the State has been severely felt in organising measures to secure the prosperity of sericulture. It has therefore been considered very necessary that a correct record should be secured of the present condition of the industry in all its branches as a starting point for the work of the department, and similar statistics collected in all subsequent years will afford a measure of the progress achieved from time to time and enable Government to see how far the energies and expenditure devoted to the subject have been justified by results.

While the forms employed omit nothing of importance in the existing state of the industry, they may have to be gradually amplified with its improvement. There is little doubt that the information rendered available will be of the highest value as a guide for future efforts at improvement. It would be possible to localise the industry to places where it can be most profitably practised and advise its abandonment where local conditions are unfavourable or where other occupations afford a better return for the resources employed. But even should the statistics serve no other purpose than that of furnishing a clear and unquestionable record of the condition of sericulture from year to year, the trouble of collecting and compiling them would be fully justified.

ORAL EVIDENCE, 14TH FEBRUARY 1917.

Mr. A. Chatterton.—*Q.* Would you mind telling the Commission what has been your previous experience before you came to Mysore in connection with the silk industry?—*A.* Before I came to Mysore I was working in the firm of my father. I studied also in the sericultural school at Padua (in Italian Padova) and I was also in Como in the school of silk weaving there. My special training was in the preparation of silk worm eggs and rearing silk worms and also reeling.

Q. Your experience is in that part of sericulture which deals with rearing and reeling?—*A.* Yes.

Q. You were engaged by the Mysore Government three years ago for twelve months to report upon the state of the silk industry and the remedies which you would suggest to deal with such difficulties as have cropped up. You have travelled all over the State? —*A.* Yes.

Q. Would you tell us briefly what you found going on in regard to silk rearing?—*A.* With regard to the methods of silk rearing here I saw that they were absolutely primitive. They have no proper idea of what is a good rearing worm. Also the appliances that are used are very unsuitable. The hygiene of the rearing rooms is ignored. They do not know the importance of good seed. They purchase cocoons for making seeds themselves, or young worms, or seeds without knowing from where it comes and how it is prepared. So they cannot have any guarantee as to assure a good crop from their rearings. I have endeavoured to introduce new methods. But the character of the people is such that it is impossible to proceed quickly and introduce new methods.

Q. Have you been able to form any opinion as to the possibilities of the silk industry?—*A.* About the possibility of the silk industry I can only speak about Mysore State because I did not see other places except Kashmir. The possibility of the silk industry is very great here in Mysore and also in Kashmir. There are a few things here which will retard the introduction of suitable means for improving sericulture. I have a few notes on the subject.

Q. Would you like to put in a copy of the notes on your experiments and observations as evidence?—*A.* Yes.†

Q. You were here for a period of twelve months and then you returned to Italy. You have returned to Mysore under an agreement with the Mysore State. Would you briefly state what position you are now holding and what salary you are drawing so that we may understand what is meant by a Director of Sericulture here?—*A.* I came here on the 1st of June last year as a Director of Sericulture.

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* Not printed.

† See Supplementary note printed after oral evidence.

Q. And you correspond direct with the Secretary to Government?—*A.* Yes. My pay is Rs. 1,000 plus travelling allowances, and a first-class fare from Italy and return.

Q. You are directly under Government?—*A.* Yes.

Q. What instructions have you received as to the nature of your work here?—*A.* The Government asked me to prepare a programme of work for every quarter. But I did not agree with it as I thought that it was impossible to prepare a quarterly programme and that it was much better to prepare a definite programme for improving sericulture. We cannot tell how much time it will take for carrying out this programme because it depends upon many circumstances. It depends very specially upon the environment. The environment here in India is very slow in adapting itself to changed methods and there are also many superstitions. So that I do not know how long it will take to improve sericulture.

Q. How long is your agreement for?—*A.* My agreement is for three years renewable from year to year.

Q. What is the actual agreement now?—*A.* It is only one year.

Q. What establishment have you got to enable you to carry out this work?—*A.* According to the new organisation besides the office establishment I ought to have two Superintendents. Till now I had two Senior Inspectors, twelve Assistant Inspectors and four Sub-Assistant Inspectors. Now we commence the execution of the scheme of organisation. Government has not agreed to appoint a number of demonstrators.

Q. How much is the budget of your department for the current year?—*A.* About Rs. 60,000.

Q. Have you got any connection, official or otherwise, with the Salvation Army Silk Farm?—*A.* I have no connection. When I was here last time I saw their farm because they were training some students. I did not see any up-to-date methods there. Perhaps they do not attach great importance to improved methods for rearing and reeling. They prefer to have reeling as a cottage industry. That is not the best thing to do. For reeling and twisting and weaving, the cottage industry is not a good thing and so they cannot compete with the big industry.

Q. Does the Government of Mysore still continue to give the Salvation Army Silk Farm a grant-in-aid?—*A.* They have reduced it now.

Q. They still continue to give it?—*A.* They give now.

Q. Is it your duty to inspect the school on behalf of the Government of Mysore?—*A.* I have not agreed to do that.

Witness subsequently forwarded the following supplementary note.

SCHEME OF ORGANIZATION.

Introductory.—From the experiments conducted by me in 1914—

The first experiment in silk-worm rearing was conducted in 1914 with Italian and Mysore breeds side by side. The Mysore breed commenced to hatch on 1st March 1914 and spun cocoons on 30th idem. The number of cocoons obtained was nearly 19,000.

The hatching of the seeds received from Italy commenced on 9th, 10th and 11th March respectively according to the different varieties and spun cocoons on the 2nd, 3rd, 4th and 7th April, respectively. The total number of cocoons obtained was 18,000.

The second experiment.—In the month of May the second experiment of Mysore and the first experiment of Bengal (Nistri) and of several cross breeds with Italian and Mysore varieties was commenced. One remarkable result achieved was that the cocoons of the cross breed were obtained from five to seven days earlier than the pure Mysore.

The third experiment.—The third crop was initiated on 31st May with Mysore and Bengal breeds and with cross breeds of Bengal and Mysore. The cross breed between Bengal and Mysore did not produce any remarkable results and therefore it was abandoned altogether.

The subsequent experiments were tried with only Mysore pure breed, with the exception of a rearing conducted with Bilatipalu breed received from Pusa.

From some layings of Bilatipalu silk-worm eggs received from Pusa in November very few worms hatched, the hatching being very irregular and spreading over a long period. The shape and colour of the cocoons were similar to those of the European breeds but the size and quality were much inferior to those produced in Channapatna with freshly imported Italian eggs. So in my annual report for 1914, I arrived at the following conclusion:—

"It may be an exotic breed, perhaps a European one, acclimatised and degenerated in India."

If the above conclusion is true, this irregularity in hatching would prove once more the necessity of a methodical hibernation of the eggs of the European breeds.

Experiments in Chikmagalur and the Bababudan hills.—After I returned to Italy in 1915, experiments of rearing were undertaken in Chikmagalur and on the Bababuda hills which are among the highest and coolest parts of the State.

The varieties tried were Mysore and Bengal pure breeds and a cross breed betwee Italian and Mysore. The seeds used were taken from the Channapatna Farm.

Comparative statement of weights of different breeds of cocoons.—A comparativ statement showing the weight of shells of cocoons for the different breeds of worm reared in 1914 in the Government Silk Farm at Channapatna and in 1915 in the Gov ernment Silk Farm at Chikmagalur is given below.

For simplifying the ratio of weight among the shells of cocoons belonging to th different breeds considered below instead of taking for basis the total number of cocoon of the Mysore pure breed obtained on the first rearing it was considered sufficient to tak a limited number of them, viz., only 25. Their total weight is equal to 2 and 8/1 drams.

This restriction does not affect practically the relation verified for the entire quantit of the cocoons reared.

The number of cocoons for the different breeds giving the same weight are a detailed below:—

Breeds.	Number of cocoons.	Breeds.	Number o cocoons.
	Channapatna farm.		
Pure Mysore first rearing ..	25	Bilatipalu	15½
Do. second „ ..	21	Chinese golden yellow	12½
Do. third „ ..	21	Chinese white	17½
Do. fourth „ ..	21	Japanese	16½
Italian (pure)	10	Bengal (pure) first rearing ..	30
Do.	10½	Do. second „ ..	27
Do.	11	Do. third „ ..	22
	Cross breed with Mysore.		
Italian	12	Chinese white	14
Chinese golden yellow	14	Japanese	13
	Chikmagalur farm.		
Mysore (pure)	22	Cross breed (Italian and Mysore)..	14
Bengal „	25		

N B.—Five floss removed from Mysore cocoons are roughly equal in weight to a shell of the same breed of the first experiment.

Inferences.—From the above data we may infer that—

(1) The improvement in the yield in silk in the Mysore breed between the first and the second experiments is more than 16 per cent, but after the second rearing no improvement was obtained in the same as far as the yield in silk is concerned.

(2) For the same number of cocoons the yield in silk from the Italian cocoons is double that of the improved Mysore cocoons.

(3) The number of seeds contained in the same weight of Italian and Mysore silkworm breeds being in the ratio of two to three it results that for the same weight in seeds the Italian breeds yield one-third more silk than the improved Mysore breed, whilst the first rearing of the Mysore pure breed would have yielded only 0.6 per cent of the Italian for the same weight of seeds.

N.B.—Here it is to be remarked that the rearing of the Italian breeds took place during the hottest part of the year, or under the most unfavourable conditions offered here for the European breeds, the temperature having reached 100° F.

(4) The difference in the yield of silk between Italian pure and cross breed (Italian with Mysore) cocoons is more than 12 per cent for the same quantity of cocoons.

(5) The Bengal breed has in three successive rearings conducted in Channapatna improved in the yield in silk by more than 26 per cent.

(6) The rearing conducted in Chikmagalur and the Bababudan hills, which are considered to be the coolest parts of the State, shows a diminution in the yield in silk by 4.71 per cent in the Mysore breed and by 13.63 per cent in the Bengal breed.

Grainages.—Regarding this important institution, which is essential for the production of good seeds, there is a strong opinion current in favour of having this situated on a high elevation. But from the preliminary attempts made in Chikmagalur and on the Bababudan hills we could be led to believe that this opinion is not perfectly justified. Yet it may happen that new experiments conducted more methodically may change this conclusion. Still in the high elevations of the State the Mysore breed may not find the best conditions for its improvement on account of the dampness and other local conditions, for instance, the sudden and much accentuated changes of temperature.

Therefore in my report to Government regarding my first tour of inspection to the Government Silk Farms I wrote as follows:—

"The object of the visit to the Nandi hills was to ascertain how far the oft expressed idea of starting a grainage there, was feasible. It was thought that owing to its chill temperature the Nandi hills would be one of the few localities in the State where the local silk-worm breed could be much improved. But besides the fact that the possibility of improving the breeds is not without limit, the temperature on the hills seems not to be sufficiently low as to show a very appreciable influence; whilst on the other hand temperature is not a sufficient condition for achieving the end. Moreover the space on the summit of the hill is too limited for anything more extensive than laboratory experiments and certainly affords no scope for an industrial undertaking."

* * * * *

"I went to the Bababudan hills for inspecting a mulberry garden there which I found in a very good condition, which demonstrates that there also mulberry could be conveniently grown; only the climatic conditions may render the rearing of worms more difficult than in other parts of the State on account of the dampness, which I hear to be very excessive in the rainy season. Yet, I think, with due precautions successful results may perhaps be obtained also during the rainy season. If so, this place by its greater extent offers better facilities for improving the Mysore breed on a commercial scale than the Nandi hills, if a real and appreciable improvement of the local breeds may be expected from the coolest temperature that can be found in the State."

Extract from my annual report for 1914.—"For sericulture, mulberry cultivation is not all that is wanted, the main point is the rearing of silk-worms but unfortunately all the conditions fit for growing mulberry are not always sufficient for rearing silk-worms conveniently. Then if it may be affirmed in a general way that in all parts of the Mysore State mulberry cultivation can be successfully tried, it is not to be believed that also silk-worm rearing will be paying everywhere; and moreover when a silk-worm crop fails the rearers lose not only the crop of leaves but also the expenses and the labour of rearing.

So that where the conditions are not quite fit, where the temperature is very high and where a scarcity of labour is felt, it is better not to substitute sericulture for the products which give already good profits. Therefore in introducing sericulture in new places it is necessary to proceed with the greatest caution, and not to create unseasonable enthusiasm among the ryots before conducting conclusive experiments; otherwise the ryots can be bitterly deluded and may lose confidence in all new enterprises proposed to them."

Reeling.—At present reeling cannot be undertaken in the improved methods as the machinery cannot be had from Europe as it is clearly shown in the following translation of the letter of Mr. Battaglia, the well known Italian constructor of reeling machinery, addressed to me—

"However sorry I may be, to be compelled myself to suggest the postponement till more propitious times, of the carrying out of the first industrial installation, especially in view of the risk that in the meantime the resolution to start it may itself vanish, I can see no possible way of arranging for a supply (of the machinery).

"Even apart from the rigorous prohibition of exports the conditions of the market for metals are such as to render impossible the manufacture of any implements unconnected with munitions of war. All metals have been requisitioned (by Government) and workmen exempted (from military service) cannot be employed on any work except that connected with the war. Under such conditions it is impossible to undertake work of any sort. If you kindly read my letter to our friend Dr. Gorio, you will agree with me that it would be nothing less than frivolous to raise hopes that machinery can be supplied.

"We are compelled to postpone the fufilment of sericultural design, from which we hoped that our studies would be crowned with success, now that all our efforts have to be concentrated on the attainment of victory. It is well that our country, which is poor in metals, prohibits the diversion of the smallest scrap from the manufacture of ammunitions. As the great war is essentially fought with metallic energy we must redouble our efforts to overcome our natural deficiency."

The chief point in the letter written by Mr. Battaglia to Dr. Gorio is the following:—

"To purchase a second hand plant would be to sacrifice the advantages of our study of local conditions, which we made with the object of introducing special features to suit those conditions.

"A plant in sound conditions cannot be had now, and I would never think of sending over to Mysore machinery which is practically not worth the cost and trouble of transport."

I would like to express my views on some points raised in a note on sericulture received by Mysore Government.

Among others it is said that:—

(1) "*Considering the appliances used the reeling is good*". It is true for some reelers it cannot be taken in a general sense.

(2) "*It would be useless to reel fine on an Italian reel and have no sale for it: it has been the experience in North India.*" As far as I have seen in December [illegible] in the Government Filature of Kashmir, in Srinagar and Jammu, and as far as I learn from the descriptions and illustrations contained in the bulletin No. 39 of the Agricultural Research Institute of Pusa concerning the method of silk reeling in Bengal, in both these places which I believe to be the most important centres for sericulture in India, not only there are not in use improved Italian or in general European reeling apparatuses, but not even those of the ancient pattern.

(3) "*I am not at all sanguine of the success of the filature in which fine qualities are produced*". I believe, and the example of China and Japan confirms my belief, that whenever a more perfect product is brought into the market it finds easier and more convenient sale. I do not know if India may be an exception, but I suppose that Indian silk when rendered as good in quality as that produced in the most advanced sericultural centres cannot fail to compete in the world market, perhaps with advantage as the wages paid here for reeling seems to be much lower than in some other parts.

Yet it is doubtful that such a result may be achieved even with the employment of perfected means if this industry is maintained essentially in the cottage stage.

This completes the Commission's record of evidence for 1916–1917.